Mark Scheme (Results)

Summer 2018

Pearson Edexcel International Advanced Level in Biology (WBI01) 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	Mark
1(a)(i)	**The only correct answer is C** **A** is not correct because amino acids are not joined in chains by ester bonds **B** is not correct because amino acids are not joined in chains by hydrogen bonds **D** is not correct because amino acids are not joined in chains by phosphodiester bonds	**(1)**

Question Number	Answer	Mark
1(a)(ii)	**The only correct answer is D** **A** is not correct because lipids are broken down by hydrolysis reaction that uses a water molecule **B** is not correct because lipids are broken down by hydrolysis reaction that uses a water molecule **C** is not correct because lipids are broken down by hydrolysis reaction that uses a water molecule	**(1)**

Question Number	Answer	Mark
1(a)(iii)	**The only correct answer is D** **A** is not correct because amylose is not branched and only has 1,4 glycosidic bonds **B** is not correct because amylose is not branched **C** is not correct because amylose only has 1,4 glycosidic bonds	**(1)**

Question Number	Answer	Mark
1(b)(i)	**The only correct answer is C** **A** is not correct because 4354 ÷ (1741 + 2612 + 4354) = 0.5 and not 0.2 **B** is not correct because 4354 ÷ (1741 + 2612 + 4354) = 0.5 and not 0.2 **D** is not correct because 4354 ÷ (1741 + 2612 + 4354) = 0.5 and not 0.7	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	idea that individual **M** is more active than individual **L** ;	**ACCEPT** converse **e.g.** more exercise / less sedentary / M is an athlete but L is not / M trains more / M has a more physical job **Need to compare M and L** **IGNORE** references to diet / lifestyle	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)(iii)	1. person N has a high {lipid diet / cholesterol levels / LDLs} ; 2. statins reduce {cholesterol levels / LDL levels / risk of CVD / eq} ;	**1 IGNORE** blood pressure / obesity **2 ACCEPT** decreases production of cholesterol by liver / blocks HMG Co A reductase **DO NOT ACCEPT** blood pressure / obesity	**(2)**

Question Number	Answer	Mark
2(a)	**The only correct answer is C** **A** is not correct because the sugar shown is a hexose **B** is not correct because the sugar shown is a hexose **D** is not correct because the sugar shown is ribose	**(1)**

Question Number	Answer	Additional Guidance	Mark
2(b)	1. idea of sequence of {bases / nucleotides / codons} (on DNA) ; 2. coding for a {sequence of amino acids / polypeptide} ;	**2 ACCEPT** protein	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(c)	1. DNA (molecule) unwinds /unzips/ strands separate /eq ;	**If ref to transcription 2max-mps1 and 3**	
	2. idea that (DNA mono) nucleotides line up alongside (both) {DNA / template} strands ;	**2 ACCEPT** pair up along both strands	
	3. by complementary base pairing ;	**3 IGNORE-base pairing rule/complementary bases only** **3 ACCEPT** adenine binds to thymine / A binds to T / guanine binds to cytosine / C binds to G	
	4. reference to hydrogen bonds {breaking / forming / eq} (between DNA bases) ;		
	5. formation of phosphodiester bonds (between adjacent DNA mononucleotides) ;		
	6. credit a correctly named (DNA) enzyme ;	**6 e.g.** (DNA) polymerase / helicase / ligase – in correct context	**(4)**

Question Number	Answer	Additional Guidance	Mark
2(d)	1. mRNA is a copy of the {genetic / DNA} {code / information} ;		
	2. idea that mRNA carries (genetic) information to the ribosomes ;	**2 ACCEPT** mRNA acts as a template for translation / eq	
	3. tRNA carries a {specific / eq} amino acid ;		
	4. idea that tRNA/rRNA holds amino acids in place for peptide bond to form ;	**4 ACCEPT** idea that tRNA anticodon binds to codon on mRNA	**(3)**

Question Number	Answer	Mark
3(a)(i)	**The only correct answer is D** **A** is not correct because S labels the vena cava **B** is not correct because S labels the vena cava **C** is not correct because S labels the vena cava	**(1)**

Question Number	Answer	Mark
3(a)(ii)	**The only correct answer is A** **B** is not correct because T labels an atrioventricular valve **C** is not correct because T labels the left atrioventricular valve **D** is not correct because T labels a the left atrioventricular valve	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	1. (time for one heart beat =) 0.74 / 0.75 / 0.76 ; 2. (heart rate =) 81 / 80 / 79 ;	**2 ACCEPT** whole numbers only ecf if value for mp 1 is in the range of 0.7 to 0.8 **Correct answer with no working gains 2 marks**	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	1. (volume of blood per beat =) 60 / 61 / 62 / 63 / 64 (cm^3) ; 2. (volume in a minute = volume of blood per beat × 79 / 80 / 81 =) 4880 / 4960 / 5040 ;	Allow ECF for heart rate from (i) |	**60**	**61**	**62**	**63**	**64**
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79	4740	4819	4898	4977	5056
80	4800	4880	4960	5040	5120
81	4860	4941	5022	5103	5184	 **Correct answer with no working gains 2 marks**	**(2)**

Question Number	Answer	Mark
3(b)(iii)	**The only correct answer is C** **A** is not correct because both sides of the heart pump the same volume of blood each minute **B** is not correct because both sides of the heart pump the same volume of blood each minute **D** is not correct because blood is pumped from the right ventricle at a lower pressure	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(c)	1. {atrial systole / atria contract / eq} moving blood into the ventricles / eq ; 2. {ventricular systole / ventricles contract / eq} moving blood into the {arteries / pulmonary artery / aorta} / eq ; 3. {diastole / atria **and** ventricles relax } and both(atria and ventricles) fill with blood / eq ;	**NB ACCEPT** in correct context of RHS, LHS or both throughout **IGNORE** references to valves throughout	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(d)	1. oxygenated and deoxygenated blood {are separate / do not mix / eq} ; 2. (this) maintains a {steep / eq} concentration gradient in the {lungs / alveoli / tissues / eq} ; 3. idea that more oxygen can be carried to the {tissues / cells / eq} ; 4. need for one pressure difference explained;	 **2 ACCEPT** maintains a {steep / eq} concentration gradient for gas exchange **3 ACCEPT** carried to all parts of body **4 e.g. (**lower to) {lungs / pulmonary circulation} to prevent damage **OR** (higher to) {body / systemic circulation} to provide blood to all tissues	**(3)**

Question Number	Answer	Additional Guidance	Mark
4(a)		**NB Answers can be pieced together**	
	1. unsaturated lipids have carbon – carbon {double / triple} bonds AND saturated lipids chains do not / eq ;	**1 ACCEPT** C=C ACCEPT saturated only have C-C single bonds	
	2. unsaturated lipids have {bent/kinked} chains AND saturated lipids have {straight/linear} chains / eq ;	**2 ACCEPT** unsaturated lipids are shorter than saturated ones (with same number of carbons) **ACCEPT** saturated lipids are straight and unsaturated are not/converse **DO NOT ACCEPT** branched	
	3. idea that unsaturated lipids have a {lower hydrogen to carbon / higher carbon to hydrogen} ratio / eq ;	**3 ACCEPT** converse for saturated lipids C atoms joined to max no of H atoms for saturated lipids unsaturated lipids have fewer hydrogens than saturated ones with same number of carbons	**(2)**

Question Number	Answer	Additional Guidance	Mark
4(b)(i)	1. unsaturated lipids have a lower (mean blood) cholesterol level / saturated have a higher (mean blood) cholesterol level ;		
	2. little / eq effect on the number of deaths ;	**2 ACCEPT** {a small / only 2%/eq} difference	**(2)**

Question Number	Answer	Additional Guidance	Mark
4(b)(ii)	1. short study time / <u>only</u> 4.5 years ; 2. small group of people studied / small sample size / eq ; 3. idea that cause of deaths are not recorded ; 4. idea that there is no information about other **named** variables ; 5. idea of no control group ;	**DO NOT ACCEPT**-ref to improvements e.g. use more people/conduct a longer study. **4** e.g. gender / age / genetics/ lifestyle/smoking **DO NOT ACCEPT**- diet only	**(2)**

Question Number	Answer	Additional Guidance	Mark
5(a)(i)	endothelial ;	**ACCEPT** endothelium / epithelial / epithelium / endothelia / epithelia	
	inflammatory ;	**ACCEPT** inflammation	
	cholesterol ;	**IGNORE** LDL / HDL	**(4)**
	atheroma/plaque ;		

Question Number	Answer	Additional Guidance	Mark
5(a)(ii)	1. idea that {atheroma / plaque / thrombus / eq} {reduces diameter / blocks / eq} coronary artery ;	**1 ACCEPT** description of coronary artery e.g. artery that supplies the heart muscle	
	2. reduced blood flow to heart {muscle /cells / tissue} ;		
	3. heart (muscle) receives less {oxygen / nutrients / glucose / eq} ;	**3 ACCEPT** ischaemia	
	4. heart (muscle) {dies / fatigues / eq} ;	**4 ACCEPT** named CHD e.g. heart attack / myocardial infarction/angina **DO NOT ACCEPT-**stroke/aneurism	**(3)**

Question Number	Answer	Additional Guidance	Mark
5(b)(i)	1. number of people who perceived they are **below average** is : greater than the total who were actually of below average risk according to BMI (57 vs 39) OR greater than those who actually were below average risk according to BMI (57 vs 25) ; 2. number of people who perceived they are **average** is : about the same as the total who were actually of average risk according to BMI (30 vs 28) OR greater than those who actually were average risk according to BMI (30 vs 9) ; 3. number of people who perceived they are **above average** is : less than the total who were actually of above average risk according to BMI (13 vs 33) OR greater than those who actually were above average risk according to BMI (13 vs 6) ; 4. credit correct manipulation of data to support MP1, 2 or 3 ;	**ACCEPT converse throughout** **ACCEPT** over estimate / at a higher risk than they thought **ACCEPT** over estimate / at a higher risk than they thought **ACCEPT** over estimate / at a higher risk than they thought **ACCEPT** under estimate / at a higher risk than they thought **ACCEPT** over estimate / at a lower risk than they thought	**(3)**

Question Number	Answer	Additional Guidance	Mark
5(b)(ii)	1. people with a high BMI {do not feel unwell / have no symptoms /eq } ;	**1 ACCEPT** CVD takes a long time to develop	
	2. lack of {awareness / education / eq} (that BMI is linked to CVD) ;	**2 ACCEPT** people do not believe they are obese / no family history	
	3. idea that BMI is not a reliable indicator of obesity in people with a high muscle mass ;	**3 ACCEPT** examples of people with high muscle mass e.g. athlete	**(2)**

Question Number	Answer	Additional Guidance	Mark
6(a)	change in the sequence of {bases / nucleotides / codons} (in DNA) ;	**ACCEPT {**base / nucleotide/codon} {deletion / insertion / substitution}	**(1)**

Question Number	Answer	Additional Guidance	Mark
*6(b)		**QWC emphasis is logical account [penalise once only]**	
	1. cystic fibrosis is {caused / eq by a recessive allele}/is a recessive disorder ;	**Do not accept gene for allele**	
	2. so {child / someone with cystic fibrosis / eq} has to be homozygous recessive / eq ;	**2 ACCEPT** diagram that labels genotype of the child with cystic fibrosis	
	3. parents are {heterozygous / carriers / eq} ;	**3 ACCEPT** diagram that labels genotypes of the parents	
	4. cystic fibrosis allele has to be inherited {from both parents / in both gametes} / eq ;	**3 ACCEPT** parents have one recessive and one dominant allele/one affected and one unaffected allele	
	5. credit details of effect of cystic fibrosis ;	**5 ACCEPT** non-functional CFTR protein/sticky mucus/eq	
	6. mutation may have occurred {in formation of gametes / post-fertilisation} ;		**(5)**

Question Number	Answer	Additional Guidance	Mark
6(c)(i)	1. (overall) *P aeruginosa* increases and *S aureus* decreases ; 2. *P aeruginosa* increases to age 25 and decreases after age 35 ; 3. *S aureus* increases to age 15 and then decreases ; 4. credit correct manipulation of figures ;	**1 Piece two parts together**	**(3)**

Question Number	Answer	Additional Guidance	Mark
6(c)(ii)	1. mucus cannot be removed (by cilia from the airways) / eq ; 2. idea that mucus traps {bacteria / pathogens} ; 3. idea that mucus provides conditions for bacteria to {live / grow / reproduce / eq } ; 4. lungs damaged by coughing are more prone to bacterial infection / eq ; 5. idea that phagocytes cannot destroy bacteria ;	**1 ACCEPT** build up of mucus / mucus blocks airways **3 ACCEPT** breed	**(3)**

Question Number	Answer	Additional Guidance	Mark
7(a)	1. biological catalyst ;	**ACCEPT** {protein / chemical} catalyst {protein / molecule / chemical} that {lowers the activation energy / speeds up reactions} **IGNORE-**substance	**(1)**

Question Number	Answer	Additional Guidance	Mark
7(b)(i)	1. (as the reaction proceeds) the {substrate / hydrogen peroxide} is used up /decreases in concentration ; 2. (therefore) {substrate / hydrogen peroxide} limits the rate of reaction / {substrate / hydrogen peroxide} becomes the limiting factor ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
7(b)(ii)	1. as {substrate / hydrogen peroxide} concentration increases {activity of catalase / rate of reaction / oxygen production} increases / eq ;	**1 ACCEPT** positive correlation **1 DO NOT ACCEPT**-linear/proportional	
	2. because more {substrate / hydrogen peroxide} to collide with {active site / enzymes} ;	**2 ACCEPT** more enzyme substrate complexes formed	
	3. idea that {catalase activity / rate of reaction / oxygen production} {levels off / plateaus / eq} as {substrate / hydrogen peroxide} increases ;	**3 DO NOT ACCEPT**-rate decreases/slows down/becomes constant	
	4. (as) {enzyme / catalase} concentration becomes limiting / no more active sites are available / eq ;	**4 ACCEPT** enzyme concentration becomes the limiting factor	**(3)**

Question Number	Answer	Additional Guidance	Mark
*7(c)	**QWC emphasis is clarity of expression** 1. idea of using different concentration of {substrate / hydrogen peroxide} ; 2. description of how to measure oxygen ; 3. idea of collecting oxygen over a period of time ; 4. {measure / calculate / eq} initial rate of reaction ; 5. repeat (each concentration of substrate) and calculate a {mean / average} ; 6. two controlled variables identified ; 7. description of how to control one named variable ;	**QWC emphasis is clarity of expression** **NB candidates who describe a wrong experiment could possibly be awarded mp 5, 6 and 7** **DO NOT ACCEPT** less than 5 stated concentrations **2 e.g.** gas syringe, measuring cylinder, counting bubbles **7 e.g.** temperature using a water bath / pH using a buffer	**(5)**

Question Number	Answer	Additional Guidance	Mark
8(a)	thromboplastin ;	**ACCEPT** thrombokinase, factor III List rule eg serotonin and thromboplastin=0	**(1)**

Question Number	Answer	Additional Guidance	Mark
8(b)	1. EDTA {stops/reduces/eq} clotting of (stored) blood ; 2. credit detail of role of calcium ions in blood clotting ;	 **2 e.g.** involved in conversion of prothrombin to thrombin / involved in formation of (insoluble) fibrin / aids formation of prothrombin activator	 **(2)**

Question Number	Answer	Additional Guidance	Mark
8(c)(i)	1. primary structure is the {order / sequence / eq}of amino acids ; 2. idea that this determines the folding of the protein ; 3. idea that (the types of) amino acids determine {type of bonds / named bond} (between R-groups) ; 4. idea that (the position of) amino acids determines position of bonds (between R-groups) ; 5. fibrinogen is a globular protein ; 6. idea that fibrinogen is {polar / hydrophilic} on the outside ;	 **2 ACCEPT** secondary structure / tertiary structure	 **(4)**

Question Number	Answer	Additional Guidance	Mark
8(c)(ii)	1. protease {breaks /hydrolyses/cuts} (peptide) bonds in fibrinogen to produce fibrin ; 2. fibrin is hydrophobic / eq ; 3. (causing) fibrin to stick together / eq ;	**3 ACCEPT** a fibrous mesh / a polymer of fibrin / cross links between fibrin **3 IGNORE**-forms (long) fibres/strands	**(2)**