

Mark Scheme (Results)

October 2020

Pearson Edexcel International Advanced Level In Biology (WBI11) Paper 01 Molecules , Diet , Transport 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)	peptide (1) amino / NH_2 / NH_3^+ / amine (1)	DO NOT ACCEPT dipeptide / polypeptide / amide ACCEPT second and third point either	
	carboxyl / COOH / CO ₂ H / COO ⁻ / carboxylic (acid) (1)	way round	
	condensation (1)	ACCEPT polymerisation / addition elimination	
	translation (1)		(5)

Question number 1(b)	Answ	Answer						Mark
		Structure	Hydrogen bonds only	lonic bonds only	Both hydrogen and ionic bonds			
		secondary structure	х	\overline{X}	X	\boxtimes		
		three-dimensional structure	X	X	x	X		(2)

Question number	Answer	Additional guidance	Mark
2(a)	• combination of alleles (1)	IGNORE genetic composition / combination of information carried in the genes / all genetic {information / make up} DO NOT ACCEPT genes	(1)

Question number	Answer	Additional guidance	Mark
2(b)	• 1 in 2 / 50:50 / 50% / 0.5 / ½	ACCEPT 2 in 4 / 1:1 / 2:2	(1)

Question number	Answer	Additional guidance	Mark
2(c)	An answer that makes reference to the following points:	CEs throughout	
	• parents shown as heterozygotes (1)	ACCEPT any pair of letters chosen to represent alleles from Punnet square	
	• genotypes of offspring shown (1)		
	• 3 (orange) : 1 (white) (1)	ACCEPT 1 white : 3 orange	(3)

Question number	Answer	Additional guidance	Mark
2(d)	 1 in 30 / 0.03 / 3.3% / ¹/₃₀ 	ACCEPT 0.03 recurring / 3.3% recurring	(1)

Question number	Answer			I	Mark
3(a)(i)	The only correct answer is B				
		contracted	relaxed		
	A is incorrect because the ventricles are relaxed				
	C is incorrect because the atria are contracted and the ventricles are relaxed				
	D is incorrect beco	ause the atria are contracted			(1)

Question number	Answer	Additional guidance	Mark
3(a)(ii)	 An explanation that includes the following points: because the atrioventricular valves have to close (before the ventricles contract) (1) 	ACCEPT {bicuspid / mitral} valve and tricuspid valve DO NOT ACCEPT valves close during ventricular systole	
	• to prevent backflow of blood into the atria (1)		(2)

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Question number	Answer	Additional guidance	Mark
3(a)(iii)	• cardiac cycle time multiplied by proportion of cycle spent in ventricular systole (1)	Example of calculation: 0.86 × $\frac{3}{8}$ / 0.3225 / 0.32 / 0.323	
	• $3.2 \times 10^2 / 3.23 \times 10^2$ (1)	Correct answer with no working gains 2 marks	(2)

Question number	Answer	Additional guidance	Mark
3(a)(iv)	• 63% / 5/8 / 0.63	ACCEPT 0.625 / 62.5% / 5 out of 8	(1)

Question number	Answer	Additional guidance	Mark
3(b)		Example of calculation:	
	• heart rate if cardiac cycle lasts 0.86 seconds (1)	60 ÷ 0.86 = 69.76744186046512	
	• heart rate if cardiac cycle last 0.46 seconds (1)	60 ÷ 0.46 = 130.4347826	
		Answer in range of 60.2 to 60.7 gains 2 marks	
	• increase in heart rate = 60 / 61 beats per minute (1)	CE from calculations of heart rate	
		Correct answer alone gains 3 marks	
			(3)

Question number	Answer	Additional guidance	Mark
4(a)(i)	• circle drawn around R, the attached sugar and a phosphate group		
		ACCEPT the phosphate group on either C3 or C5	(1)

Question number	Answer				Mark
4(a)(ii)	The only correct answer is D				
		phosphodiester	covalent	hydrogen	
	A is incorrect because S is a phosphodiester bond, T is a covalent bond and U is a hydrogen bond				
	B is incorrect because S is a phosphodiester bond and U is a hydrogen bond				
	C is incorrect because T is a	covalent bond and U is a hydr	ogen bond		(1)

Question number	Answer	Mark
4(a)(iii)	The only correct answer is C Thymine	
	A is incorrect because adenine is complementary to thymine	
	B is incorrect because adenine is complementary to thymine	
	D is incorrect because adenine is complementary to thymine	(1)

Question number	Answer	Additional guidance	Mark
4(b)(i)	A diagram that shows the following points:) (
	• a band the same width as stage 1 in the middle of the tube (1)	DNA taken after stage 2	
	 bands drawn at the top and middle of tube (1) both bands narrower than stage 1 (1) 	DNA taken af ter	
	 bands drawn at the top and middle of tube (1) top band drawn narrower than stage 1 but wider than stage 3 and lower band drawn narrower than stage 3 (1) 	stage 3 DNA taken after stage 4	
			(5)

Question number	Answer	Mark
4(b)(ii)	The only correct answer is B	
	A is incorrect because neither DNA molecule is made of all heavy nitrogen or light nitrogen C is incorrect because neither DNA molecule is made of all heavy nitrogen or light nitrogen + bands are too wide	
	D is incorrect because it has only one band	(1)

Question number	Answer	Additional guidance	Mark
5(a)	ACCEPT any two from :	IGNORE risk factors	
	• BMI / body mass index	ACCEPT mass ÷ height ² / weight ÷ height ²	
	• waist to hip ratio / hip to waist ratio		
	• waist to height ratio / height to waist ratio		
	waist circumference		
	• skin fold (thickness)		(1)
			(1)

Question number	Answer	Mark
5(b)(i)	The only correct answer is B	
	B 1-6 only	
	A is incorrect because 1-4 bonds are present in straight chains only	
	C is incorrect because 1-4 bonds are present in straight chains only	
	D is incorrect because 1-6 bonds form the branches	(1)

Question number	Answer	Additional guidance	Mark
5(b)(ii)	 makes the person feel full / prevents so much food from being in the stomach / fills up the stomach so less food needed to satisfy hunger / glucomannan takes the space of the food (1) 	IGNORE: reduces food intake decreases volume of stomach	(1)

Question number	Answer	Additional guidance	Mark
5(b)(iii)	An explanation that includes the following points:		
	 because it contains lots of {monosaccharides / glucose / energy} (1) 	ACCEPT sugar for glucose polymer of glucose lots of mannose broken down into lots of {glucose / monosaccharides / mannose}	
	 therefore {energy input could be greater than energy output / (excess) glucose converted to fat} (1) glucomannan would no longer be filling up the stomach so 	ACCEPT excess energy stored as fat	
	more food could be eaten (1)		(2)

Question number	Answer	Additional guidance	Mark
5(c)(i)	An answer that includes the following points:		
	• group on low fat diet lost 4.3 (kg) and group on very low- carbohydrate diet lost 8.1 (kg) (1)	ACCEPT group on low fat diet lost 3.8 (kg) more	
	• (overall) loss of 8.1 (kg) is {1.88 / 1.9} times more weight (1)	ACCEPT about twice as much / for low- fat diet this is 4.6% of starting weight and for very low-carbohydrate 8.9% starting weight	
	• which is slightly lower than the other studies are claiming (1)		
		ACCEPT results are at the lower end of	
	• claims are referring to low-carbohydrate diet but this one is a	the claim	
	very low-carbohydrate diet (1)		(3)

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Question number	Answer	Additional guidance	Mark
5(c)(ii)	An answer that includes two of the following points:	IGNORE other named risk factors	
	 (blood) {cholesterol / LDL} levels (1) 	ACCEPT LDL : HDL	
	• blood pressure (1)		
	• heart rate (1)		(2)

Question number	Answer	Additional guidance	Mark
*6(a)	Indicative content:		
	• triplet codon system (D)	ACCEPT three bases code for one amino acid	
	• because (at least) 20 codes needed for the amino acids (E)	ACCEPT each amino acid has its own code	
	• e.g. AAC is code for asparagine (x)		
	• degenerate code (D)		
	• therefore some amino acids have more than one code (E)	ACCEPT there are more codes than necessary	
	• e.g. threonine can be coded for by ACA, ACC, ACG or ACT (x)	than necessary	
	 non-overlapping code (D) 		
	• so each base on DNA is used in only one triplet codon (E)	ACCEPT discrete	
	• e.g. AAC AGA codes for two amino acids (x)		(6)
	ers to triplet codon system, degenerative code or non-overlapping code but n	o examples or explanation given	
1 mark = 1			
	out of 3 or 1 out of 3 + a linked example or explanation		
	ers to triplet codon system, degenerative code or non-overlapping code with e	either examples or explanation give	n
	least 2 examples or 2 explanations or 1 of each		
	: least 3 examples or 3 explanations or any combination of each	examples and explanation given	
	ers to triplet codon system, degenerative code and non-overlapping code with least 4 examples or explanations or any combination of each	rexamples and explanation given	
	least 5 examples or explanations or any combination of each		

Question number	Answer	Additional guidance	Mark
6(b)(i)	• methionine alanine cysteine proline isoleucine leucine	ACCEPT phonetic spelling / reasonable abbreviations / M A C P I L	(1)

Question number	Answer	Additional guidance	Mark
6(b)(ii)	 An explanation that includes the following points: it will have no effect (on the polypeptide) if the ninth base becomes a T as this still codes for {cysteine / same amino acid} 		
	(1)		
	• will code for a stop codon if the ninth base becomes an A (1)	ACCEPT only two amino acids will join	
	 therefore the {protein / polypeptide} will be {shorter / not formed} (1) 	together	
	• will code for tryptophan if the ninth base becomes G (1)		
	• this could change the bonding in the protein (1)	ACCEPT even if tryptophan not given / given wrongly ACCEPT even if tryptophan not given /	
	• changing the {structure / activity} of the protein (1)	given wrongly	(5)

Question number	Answer	Additional guidance	Mark
7(a)	A description that includes the following point:		
	• to be present in the blood (all the time) (1)	ACCEPT precursor of clotting process / inactive form of thrombin / inactive enzyme / inactive plasma protein	
	and any TWO of the following:		
	• needed to make thrombin (when blood needs to clot) (1)		
	• which is an {enzyme / catalyst} (1)		
	• so that fibrinogen can be converted into fibrin (1)		
		NB thrombin catalyses fibrinogen into	
		fibrin = 2 marks	(3)

Question number	Answer	Mark
7(b)	The only correct answer is A	
	A anticoagulant	
	B is incorrect because antihypertensives treat high blood pressure	
	<i>C</i> is incorrect because platelet inhibitors inhibit platelets, which are involved in the cascade before prothrombin and prothrombin is made by the liver	
	D is incorrect because statins treat high blood cholesterol levels	(1)

Question number	Answer	Additional guidance	Mark
7(c)(i)	An answer that includes the following points:		
	• warfarin and vitamin K have a similar structure (1)	ACCEPT both have rings / double bond oxygen	
	 therefore warfarin {binds / blocks} to the {vitamin K epoxide reductase / VKOR} (1) 	ACCEPT warfarin is a {competitive / active-site directed } inhibitor / description DO NOT ACCEPT non-competitive inhibitor / description of one binds to vitamin K	
	 (as a result of warfarin binding to enzyme) {less / no} vitamin K reduced (1) 		(2)

Question number	Answer	Additional guidance	Mark
7(c)(ii)	 An answer that includes the following points: increase in vitamin K would compete with warfarin for the active site (of vitamin K epoxide reductase / VKOR) (1) therefore {some / more} vitamin K will be reduced (if vitamin K binds to enzyme) (1) 	ACCEPT a description e.g. more enzyme substrate complexes	
			(2)

Question number	Answer	Additional guidance	Mark
7(d)	An explanation that includes the following points:		
	 large groups of people (1) 	ACCEPT 20 + IGNORE reference to control groups	
	• (sample size is large) for reproducibility (1)	ACCEPT repeatable / reliable IGNORE accurate / precise / valid	
	 people in both groups consume the same {mass / volume / concentration} of vitamin K (1) 	IGNORE amount	
	 people in both groups consume the same concentration of drugs (1) 	ACCEPT other appropriate named control variable e.g. sex, age, diet, level of activity, alcohol intake IGNORE same number of people in each group / amount	
	• (variables controlled) for validity (1)	IGNORE accurate / precise /reproducible / repeatable / reliable	(4)

Question number	Answer	Additional guidance	Mark
8(a)	An answer that includes three of the following points:		
	Similarities	NB Do not piece together from two descriptions in separate sentences IGNORE diagrams	
	Any two from:		
	• both contain a glycerol (1)		
	• both contain fatty acids (1)		
	• both contain ester bonds (1)		
	Differences		
	• triglycerides have three fatty acids and phospholipids have two fatty acids (1)		
	 triglycerides do not contain a phosphate group but phospholipids do contain a phosphate group (1) 		
			(3)

Question number	Answer	Additional guidance	Mark
8(b)	 An explanation that includes the following points: {protein / phosphate heads / phospholipid heads} are {soluble / 		
	 hydrophilic / polar} and interact with {blood / plasma} (1) {fatty acids / triglycerides /cholesterol} is {insoluble / non-polar / hydrophobic} (1) 		
	 therefore cholesterol is surrounded by {fatty acid tails / triglycerides} (1) 		(3)

Question number	Answer	Additional guidance	Mark
8(c)(i)	• volume of sphere calculated / values substituted into the equation (1)	Example of calculation = 6912 if using π = 3 = 7142.4 if using π = 3.1 = 7234.56 if using π = 3.14 = 7239.168 if using π = 3.142 = 7241.472 if using π = 3.143 = 7238.22947387 if pressing π on calculator	
	 volume of sphere rounded up to nearest whole number (1) 	= 6912 / 7142 / 7235 / 7239 / 7238 / 7241 ACCEPT 6910 / 7140 / 7240 NB Just these values given = 2 marks	
	• ratio calculated (1)	14 : 1 13 : 1 if 6910 / 6912	
		CE apply throughout NB mark answer in table if different from in the working e.g.	
		Diameter of LDL / nmVolume of LDL / nm3Volume of cholesterol / nm3Ratio of LDL volume to cholesterol volume	
		7235 14:1	
		= 2 marks = 1 mark	(3)

Question number	Answer	Additional guidance	Mark
*8(c)(ii)	Indicative content:		
	 as LDL increases, risk increases (K / G) 		
	• several factors beside LDLs can increase the risk of CVD (K)		
	• example of a factor given e.g. high blood pressure (K)		
	• LDLs can be different sizes (Q)		
	 and therefore be absorbed by endothelial cells differently (Q) 		
	• and therefore get broken down at different rates (K / Q)		
	• and therefore carry different volumes of cholesterol (Q)		
	• level of HDL (in blood) affects risk (of CVD) (K / G)		
	• example given from graph e.g. 0.65 a.u. has greater risk than 2.20 a.u. (G)		
	• ratio of LDL : HDL affects risk (of developing CVD) (K / G)		
	• the lower LDL : HDL the ratio the lower risk of CVD (K / G)		(6)
	edge (K), information given in the graph (G), information in the question (Q) es either (K), (G) or (Q) 1 mark = 1 comment, 2 marks = 2 comments		
Level 2 : use	es two from (K), (G) or (Q) 3 marks = 3 comments, 4 marks = 4 comment es (K), (G) and (Q) 5 marks = 5 comments, 6 marks = 6 comments	ts	

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