Mark Scheme (Results)

October 2020

Pearson Edexcel International Advanced Level In Biology (WBI11) Paper 01 Molecules , Diet , Transport and Health

Question number	Answer	Additional guidance	Mark
1(a)	peptide (1) amino / NH_2 / NH_3^+ / amine (1) carboxyl / COOH / CO_2H / COO^- / carboxylic (acid) (1) condensation (1) translation (1)	**DO NOT ACCEPT** dipeptide / polypeptide / amide **ACCEPT** second and third point either way round **ACCEPT** polymerisation / addition elimination	**(5)**

Question number	Answer					Mark
1(b)						**(2)**

Structure	Hydrogen bonds only	Ionic bonds only	Both hydrogen and ionic bonds	Neither of these bond
secondary structure	**X**	☒	☒	☒
three-dimensional structure	☒	☒	**X**	☒

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: • parents shown as heterozygotes (1) • genotypes of offspring shown (1) • 3 (orange) : 1 (white) (1)	CEs throughout **ACCEPT** any pair of letters chosen to represent alleles from Punnet square **ACCEPT** 1 white : 3 orange	**(3)**

Question number	Answer	Additional guidance	Mark
2(d)	• 1 in 30 / 0.03 / 3.3% / $\frac{1}{30}$	ACCEPT 0.03 recurring / 3.3% recurring	**(1)**

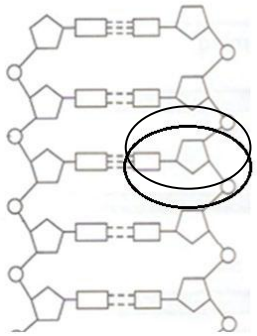
Question number	Answer	Mark
3(a)(i)	**The only correct answer is B** contracted | relaxed ***A*** *is incorrect because the ventricles are relaxed* ***C*** *is incorrect because the atria are contracted and the ventricles are relaxed* ***D*** *is incorrect because the atria are contracted*	**(1)**

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) • to prevent backflow of blood into the atria (1)	**ACCEPT** {bicuspid / mitral} valve **and** tricuspid valve **DO NOT ACCEPT** valves close during ventricular systole	**(2)**

Question number	Answer	Additional guidance	Mark
3(a)(iii)	• cardiac cycle time multiplied by proportion of cycle spent in ventricular systole (1) • 3.2×10^2 / 3.23×10^2 (1)	Example of calculation: 0.86 × ⅜ / 0.3225 / 0.32 / 0.323 Correct answer with no working gains 2 marks	**(2)**

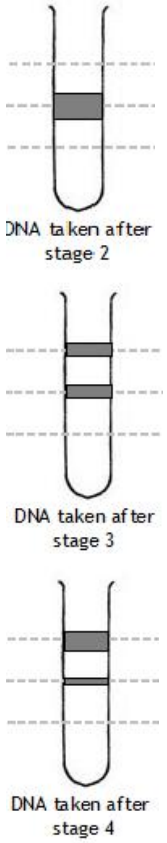
Question number	Answer	Additional guidance	Mark
3(a)(iv)	• 63% / 5/8 / 0.63	**ACCEPT** 0.625 / 62.5% / 5 out of 8	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)	• heart rate if cardiac cycle lasts 0.86 seconds (1) • heart rate if cardiac cycle last 0.46 seconds (1) • increase in heart rate = 60 / 61 beats per minute (1)	Example of calculation: 60 ÷ 0.86 = 69.76744186046512 60 ÷ 0.46 = 130.4347826 Answer in range of 60.2 to 60.7 gains 2 marks 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 hydrogen 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) • bands drawn at the top and middle of tube (1) • both bands narrower than stage 1 (1) • 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)		**(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 : • BMI / body mass index • waist to hip ratio / hip to waist ratio • waist to height ratio / height to waist ratio • waist circumference • skin fold (thickness)	**IGNORE** risk factors **ACCEPT** mass ÷ height^2 / weight ÷ height^2	**(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) • 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 more food could be eaten (1)	**ACCEPT** sugar for glucose polymer of glucose lots of mannose broken down into lots of {glucose / monosaccharides / mannose} **ACCEPT** excess energy stored as fat	**(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) • (overall) loss of 8.1 (kg) is {1.88 / 1.9} times more weight (1) • which is slightly lower than the other studies are claiming (1) • claims are referring to low-carbohydrate diet but this one is a very low-carbohydrate diet (1)	**ACCEPT** group on low fat diet lost 3.8 (kg) more **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 **ACCEPT** results are at the lower end of the claim	**(3)**

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

Question number	Answer	Additional guidance	Mark
*6(a)	Indicative content: • triplet codon system (D) • because (at least) 20 codes needed for the amino acids (E) • e.g. AAC is code for asparagine (x) • degenerate code (D) • therefore some amino acids have more than one code (E) • e.g. threonine can be coded for by ACA, ACC, ACG or ACT (x) • non-overlapping code (D) • so each base on DNA is used in only one triplet codon (E) • e.g. AAC AGA codes for two amino acids (x)	**ACCEPT** three bases code for one amino acid **ACCEPT** each amino acid has its own code **ACCEPT** there are more codes than necessary **ACCEPT** discrete	**(6)**

Level 1 : refers to triplet codon system, degenerative code **or** non-overlapping code but no examples or explanation given
1 mark = 1 out of 3
2 marks = 2 out of 3 or 1 out of 3 + a linked example or explanation
Level 2 : refers to triplet codon system, degenerative code **or** non-overlapping code with either examples or explanation given
3 marks = at least 2 examples or 2 explanations or 1 of each
4 marks = at least 3 examples or 3 explanations or any combination of each
Level 3 : refers to triplet codon system, degenerative code **and** non-overlapping code with examples and explanation given
5 marks **=** at least 4 examples or explanations or any combination of each
6 marks **=** at 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) • therefore the {protein / polypeptide} will be {shorter / not formed} (1) • will code for tryptophan if the ninth base becomes G (1) • this could change the bonding in the protein (1) • changing the {structure / activity} of the protein (1)	**ACCEPT** only two amino acids will join together **ACCEPT** even if tryptophan not given / given wrongly **ACCEPT** even if tryptophan not given / 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) 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)	**ACCEPT** precursor of clotting process / inactive form of thrombin / inactive enzyme / inactive plasma protein **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* ***C*** *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) • therefore warfarin {binds / blocks} to the {vitamin K epoxide reductase / VKOR} (1) • (as a result of warfarin binding to enzyme) {less / no} vitamin K reduced (1)	**ACCEPT** both have rings / double bond oxygen **ACCEPT** warfarin is a {competitive / active-site directed } inhibitor / description **DO NOT ACCEPT** non-competitive inhibitor / description of one binds to vitamin K	**(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) • (sample size is large) for reproducibility (1) • people in both groups consume the same {mass / volume / concentration} of vitamin K (1) • people in both groups consume the same concentration of drugs (1) • (variables controlled) for validity (1)	**ACCEPT** 20 + **IGNORE** reference to control groups **ACCEPT** repeatable / reliable **IGNORE** accurate / precise / valid **IGNORE** amount **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 **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 **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)	**NB** Do not piece together from two descriptions in separate sentences **IGNORE** diagrams	**(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)**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>8(c)(i)</td><td>

- volume of sphere calculated / values substituted into the equation (1)

- volume of sphere rounded up to nearest whole number (1)

- ratio calculated (1)

</td><td>

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

= 6912 / 7142 / 7235 / 7239 / 7238 / 7241
ACCEPT 6910 / 7140 / 7240
NB Just these values given = 2 marks

14 : 1
13 : 1 if 6910 / 6912

CE apply throughout
NB mark answer in table if different from in the working e.g.

<table>
<tr><th>Diameter of LDL / nm</th><th>Volume of LDL / nm^3</th><th>Volume of cholesterol / nm^3</th><th>Ratio of LDL volume to cholesterol volume</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>7235

= 2 marks</td><td></td><td>14 : 1

= 1 mark</td></tr>
</table>

</td><td>(3)</td></tr>
</table>

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)**
Own knowledge (K), information given in the graph (G), information in the question (Q) **Level 1 :** uses either (K), (G) **or** (Q) 1 mark = 1 comment, 2 marks = 2 comments **Level 2 :** uses two from (K), (G) **or** (Q) 3 marks = 3 comments, 4 marks = 4 comments **Level 3 :** uses (K), (G) **and** (Q) 5 marks = 5 comments, 6 marks = 6 comments			