Mark Scheme (Results)

Summer 2019

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

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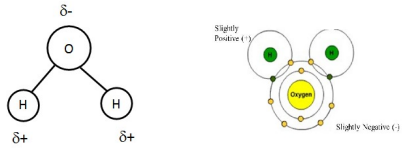
General Marking Guidance

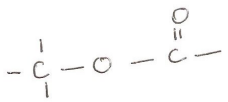
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should 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)	A diagram that includes the following: • 2 hydrogens joined to an oxygen (by covalent bonds) (1) • the charge distribution (1)	 e.g. lines, overlapping circles, shared electrons	**(2)**

Question number	Answer	Additional guidance	Mark
1(b)(i)	A description that includes the following points: • for F increase in temperature increases solubility (1) • for G increase in temperature increases up to 30°C and then decreases the solubility (1) • for H temperature has no effect (on solubility) (1)	**ACCEPT** 'It' for solubility throughout **ACCEPT** positive correlation Do not piece together **ACCEPT** solubility {remains constant / does not change} with an increase in temperature	**(3)**

Question number	Answer	Mark
1(b)(ii)	The only correct answer is B 1.67 ***A*** *is incorrect because 50 ÷ 30 = 1.67* ***C*** *is incorrect because 50 ÷ 30 = 1.67* ***D*** *is incorrect because 50 ÷ 30 = 1.67*	**(1)**

Question number	Answer	Mark
2(a)(i)	The only correct answer is B 1 : 3 ***A*** *is incorrect because triglycerides are composed of one glycerol molecule and three fatty acids* ***C*** *is incorrect because triglycerides are composed of one glycerol molecule and three fatty acids* ***D*** *is incorrect because triglycerides are composed of one glycerol molecule and three fatty acids*	**(1)**

Question number	Answer	Mark
2(a)(ii)	 The only correct answer is C. ***A*** *is incorrect because this shows a peptide bond* ***B*** *is incorrect because an ester bond does not contain a nitrogen* ***D*** *is incorrect because there should be a double O on the carbon*	**(1)**

Question number	Answer	Additional guidance	Mark
2(a)(iii)	An explanation that includes the following points: • palmitoleic and linoleic (acid) (1) • because they {are unsaturated fatty acids / have double bonds (between carbon atoms)} (1) **OR** • linoleic (acid) (1) • because it has {two / the most} double bonds (between carbon atoms) (1)	**ACCEPT** converse in the context of butyric acid and stearic acid having the lowest risk **IGNORE** chain length **ACCEPT** polyunsaturated **IGNORE** chain length	**(2)**

Question number	Answer	Additional guidance	Mark
2(b)(i)	An explanation that includes the following points: • because thrombin would not be able to bind to **fibrinogen** (1) • therefore fibrin is not formed (1)	 **ACCEPT** fits active site / thrombin – fibrinogen complexes **ACCEPT** less fibrin formed	 **(2)**

Question number	Answer	Additional guidance	Mark
2(b)(ii)	An explanation that includes the following points: • because the platelets would not be able to bind to fibrin (1) • therefore the {mesh / clot} would not be formed (1) OR • and therefore do not release thromboplastin (if not binding to each other / endothelium) (1)	 **ACCEPT** not able to bind to {blood cells / other platelets / endothelium} less sticky	 **(2)**

Question number	Answer	Additional guidance	Mark
2(b)(iii)	An explanation that includes the following points: • therefore plasmin {**hydrolyses** fibrin / breaks the **peptide bonds** in fibrin} (1) • because {without fibrin / with less fibrin} there is {nothing / less} to trap the {platelets / blood cells} (1)	**ACCEPT** {no / less} mesh formed	**(2)**

Question number	Answer	Additional guidance	Mark
3(a)(i)	<table><tr><td>tryptophan</td><td>serine</td><td>serine</td><td>lysine</td><td>tryptophan</td></tr></table>	**ACCEPT** trp for tryptophan ser for serine lys for lysine	**(1)**

Question number	Answer	Additional guidance	Mark
3(a)(ii)	An explanation that includes the following points: • because {three bases form one code (for one amino acid) / there are 5 codons} (1) • because {there is no stop codon in this sequence / it is a **non-overlapping** (genetic) code} (1)	**ACCEPT** triplet {codon / code} **IGNORE** three bases make an amino acid **DO NOT ACCEPT** degenerate	**(2)**

Question number	Answer	Additional guidance	Mark
3(b)	An explanation that includes three of the following points: • because it is a **degenerate code** (1) • which means that there are more codes than {needed / number of amino acids} (1) • (arranging the four bases in triplets gives) 64 possible combinations and there are 20 amino acids to code for (and stop codons) (1) • minimises the effect of mutations (1)	**DO NOT ACCEPT** non-overlapping **ALLOW** from a description	**(3)**

Question number	Answer	Additional guidance	Mark
3(c)(i)	• 95.31 (1)		**(1)**

Question number	Answer	Additional guidance	Mark
3(c)(ii)	An explanation that includes the following points: • (remaining codes are) stop {codons / codes} (on RNA / DNA) (1) • therefore no more amino acids can be added to the {polypeptide chain / protein} (1)	**DO NOT ACCEPT** start codons **ACCEPT** ends translation / signals end of (m)RNA	**(2)**

Question number	Answer	Mark
3(d)	The only correct answer is B. ACC | UGG ***A*** *is incorrect because T binds to A and C to G on mRNA and U binds to T and G binds to C on tRNA* ***C*** *is incorrect because T binds to A and C to G on mRNA and U binds to T and G binds to C on tRNA* ***D*** *is incorrect because T binds to A and C to G on mRNA and U binds to T and G binds to C on tRNA*	**(1)**

Question number	Answer	Additional guidance	Mark
4(a)(i)	An answer that includes the following points: • an increase in the number of (DNA) {molecules / double helices} (1) • each (new molecule) consists of one {parent / original / old} strand and one new strand (1)	**ACCEPT** {two / new} molecules are made (from one molecule)	**(2)**

Question number	Answer	Additional guidance	Mark
4(a)(ii)	(DNA) helicase / polymerase / ligase (1)	**ACCEPT** swivelase / untwistase / topoisomerase	**(1)**

Question number	Answer	Additional guidance	Mark
4(a)(iii)	An explanation that includes the following points: • because it results in **genetically** identical (daughter) cells (1)	**ACCEPT** same {genetic information /	

	• that will have the same {structure / function} (as the parent cell) (1)	genotype / alleles / DNA sequence}	**(2)**

Question number	Answer	Additional guidance	Mark
4(b)	<table><tr><th rowspan="2">Stage</th><th colspan="3">Percentage of the DNA molecules containing</th></tr><tr><th>heavy nitrogen only</th><th>light nitrogen only</th><th>both heavy and light nitrogen</th></tr><tr><td>1</td><td>100</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>0</td><td>100</td></tr><tr><td>3</td><td>0</td><td>50</td><td>50</td></tr></table>	**N.B.** mark the rows not the columns **DO NOT ACCEPT** empty boxes	**(3)**

Question number	Answer	Mark
5(a)(i)	The only correct answer is C. fructose and glucose | sucrose only ***A*** *is incorrect because glucose is also a monosaccharide not a disaccharide* ***B*** *is incorrect because fructose is also a monosaccharide and not a disaccharide* ***D*** *is incorrect because sucrose is not a monosaccharide and fructose is not a disaccharide*	**(1)**

Question number	Answer	Mark
5(a)(ii)	The only correct answer is B glycosidic	

	A *is incorrect because ester bonds join organic acids and alcohols together* ***C*** *is incorrect because peptide bonds join amino acids together* ***D*** *is incorrect because phosphodiester bonds joins mononucleotides together*	**(1)**

Question number	Answer	Additional guidance	Mark
5(b)(i)	A calculation showing the following steps: • the mean calculated (1) • the mean converted to g dm^{-3} (1)	Example of calculation : (1.22 + 1.02 + 1.00) ÷ 3 / 1.08 0.00108 / 0.0011 / 1.08 × 10^{-3} Correct answer with no working shown gains both marks.	**(1)**

Question number	Answer
***5(b) (ii)**	Indicative content: • sugar solution with a lower water potential than the cytoplasm of the cell (D) • sugar solution should be hypertonic (D) • so that water will pass out of the cytoplasm by osmosis (E) • concentration of sugar solution should be the same as the cytoplasm (D) • so that sugars will not diffuse out (E) • each individual sugar concentration should be the same as the cytoplasm (D) • mean concentration of sugars stated (fructose = 1.52, glucose = 1.08, sucrose = 8.55) (D) • range of sugar concentrations stated (from table) (D)

	• so that concentration of each sugar remains the same (E) • another solute needs to be used (D) • so that the sugar concentration remains the same but the water passes out (E) Level 1 : description of conditions needed for osmosis and maintaining sugar concentration 1 mark = a description of one condition 2 marks = a description of each condition or an explanation of one condition Level 2 : explanation of conditions needed for both osmosis and maintaining sugar concentration 3 marks = a description of one condition and an explanation of the other condition 4 marks = an explanation of each condition Level 3 : indicates that concentration of each sugar needs to be the same as in the pineapple and another solute needs to be included. 5 marks = and includes one of the above 6 marks = and includes both of the above

Question number	Answer	Additional guidance	Mark
6(a)	An explanation that includes the following points: • because antioxidants reduce free radicals (1) • free radicals cause {cell damage / oxidative stress} (1) • (antioxidants) reduce {plaque / atheroma} formation (1)	 **ACCEPT** neutralise / stabilise / donate electrons **ACCEPT** antioxidants {prevent cell damage / reduce oxidative stress} **ACCEPT** reduces cholesterol build up	**(3)**

Question number	Answer	Additional guidance	Mark
6(b)(i)	An explanation that includes the following points: • dark chocolate contains more flavenoids (than milk chocolate per 100g) (1) • and therefore more antioxidants to reduce the risk of CVD (1) • dark chocolate contains less energy (per unit mass) than milk chocolate (1) • so is less likely to cause obesity which {is a risk factor / decreases the risk} of CVD (1)	**ACCEPT matching converse points** **ACCEPT** description of what antioxidants do **IGNORE** incorrect descriptions **ACCEPT** calories **ACCEPT** overweight	**(4)**

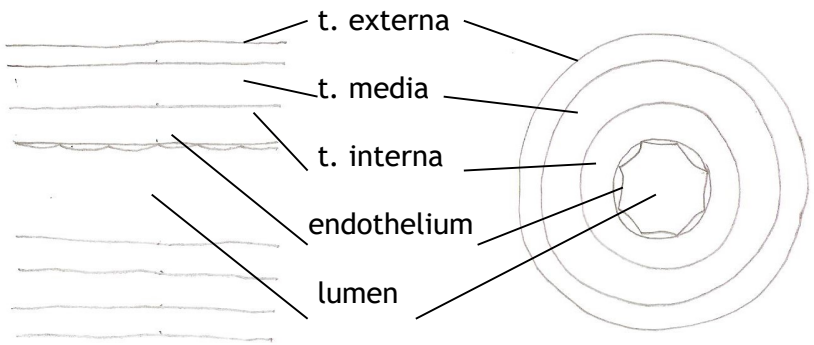
Question number	Answer	Mark
6(b)(ii)	The only correct answer is A cocoa mass ***B*** *is incorrect because both types of chocolate contain similar % of milk fat* ***C*** *is incorrect because both types of chocolate contain similar % of sugar* ***D*** *is incorrect because milk chocolate contains more whole milk powder than dark chocolate*	**(1)**

Question number	Answer	Additional guidance	Mark
6(b)(iii)	An answer that includes three of the following points: • two groups of people one eating chocolate and one {control / not eating chocolate} (1) • who {have no (known) risk of / do not have} CVD (1) • credit description of control variable • incidence of heart disease recorded (over a period of time, at least a year) (1)	 **ACCEPT** 3 groups if one has no chocolate, one has milk chocolate and one has dark chocolate **ACCEPT** healthy e.g. same sex, similar {size / age / lifestyle} **ACCEPT** same mass of chocolate if comparing dark with milk chocolate **IGNORE** amount **ACCEPT** monitor risk factors / examples e.g. blood pressure,	

		cholesterol levels, BMI	**(3)**

Question number	Answer	Additional guidance	Mark
7(a)	answer to no more than one decimal place in the range of 1.3 to 2.4 (m)		**(1)**

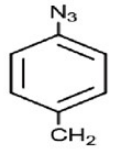
Question number	Answer	Additional guidance	Mark
7(b)	An explanation that includes two of the following points: • because blood has to be pumped under high pressure (from the heart) (1) • so that the blood can reach the { brain / head} (1) • pump blood against (the force of) gravity (to the upper parts of the body) (1)		**(2)**

Question number	Answer	Additional guidance	Mark
7(c)(i)	A drawing that shows : • {3 layers / 3 layers and endothelium} + lumen (1) **Any two from:** • lumen (1) • endothelium / epithelium (1) • tunica {interna / intima} (1) • tunica media (1) • tunica {externa / adventitia} (1)	 **ACCEPT** inside line labelled if 2 layer diagram with no endothelium labelled **IGNORE** smooth muscle **ACCEPT (**smooth) muscle (cells) and elastic fibres **ACCEPT** collagen fibres **N.B.** If one incorrect label, max of 1 label mark If two incorrect labels then no label marks can be awarded	**(3)**

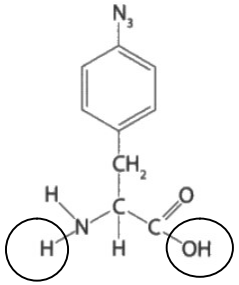
Question number	Answer	Additional guidance	Mark
7(c)(ii)	An explanation that includes the following points: • the blood is under high pressure so that the {arteries need to widen / elastic fibres need to stretch} (1) • elastic recoil necessary to maintain the high blood pressure (1)	**N.B.** need to stretch and recoil to {maintain / accommodate} high pressure = 1 mark if no other mps awarded	**(2)**

Question number	Answer	Additional guidance	Mark
7(d)(i)	An explanation that includes the following points: • because there will be less blood flowing (near the surface of the skin at any one time) (1) • therefore blood clot will form {more easily / faster} (1)	**ACCEPT** blood at {lower / low} pressure **ACCEPT** clotting will be {faster / easier} less blood lost whilst clot forming	**(2)**

Question number	Answer	Additional guidance	Mark
7(d)(ii)	An explanation that includes the following points: • because (the smaller red blood cells will have) a greater surface area (1) • and therefore oxygen will be able to **diffuse** (into / out of the RBCs) faster (1)	**IGNORE** easier to diffuse / more can diffuse	**(2)**

Question number	Answer	Mark
8(a)	The only correct answer is B.  ***A*** *is incorrect because the R group does not include the central carbon* ***C*** *is incorrect because the R group should have a* CH_2 *group* ***D*** *is incorrect because the H and central carbon and only part of the R group shown*	**(1)**

Question number	Answer	Additional guidance	Mark
8(b)(i)	peptide / amide (bond)	**DO NOT ACCEPT** dipeptide / polypeptide (bond)	**(1)**

Question number	Answer	Additional guidance	Mark
8(b)(ii)	A drawing that shows : • a circle around **one** H on the N (1) • a circle around only the OH group on the C (1)		**(2)**

Question number	Answer	Additional guidance	Mark
8(b)(iii)	An explanation that includes three of the following points : • because AzPhe is not a naturally-occurring amino acid (1) • therefore there is no {DNA / mRNA} codon for AzPhe (1) • therefore there is no tRNA (that can bind to the AzPhe) (1) • therefore AzPhe not held in position for peptide bond to form (1)		**(3)**

Question number	Answer	Additional guidance	Mark
8(c)(i)	A calculation showing the following steps: • the percentage of AzPhe are calculated (1) • ratio calculated (1)	Example of calculation : 16% of 1% of 1 100 = 1.76 5.25 : 1 / 21 : 4 **ACCEPT** 1 : 0.19 Correct answer with no working shown gains both marks.	**(2)**

Question number	Answer	Additional guidance	Mark
8(c)(ii)	An answer that includes four of the following points: • properties of a protein is dependent on the structure of a protein (1) • AzPhe could affect the {secondary structure / folding / 3D shape} (of the silk) (1) • because different bonds (between R groups) could form (1) • new bonds might make the {silk / fibres / molecule / protein} stronger (1) • larger R groups will make the protein insoluble (1) **OR** • larger R groups will make the {silk / fibres / molecule / protein} weaker (1) • because {fibres / molecule / protein} not held so closely together (1)	**ACCEPT** tertiary structure **IGNORE** quaternary structure **ACCEPT** named example of bond changing	**(4)**

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