



Mark Scheme (Results)

October 2023

Pearson Edexcel International Advanced
Subsidiary Level In Biology (WBI11)

Paper 01

Unit 1: Molecules, Diet, Transportation
and Health

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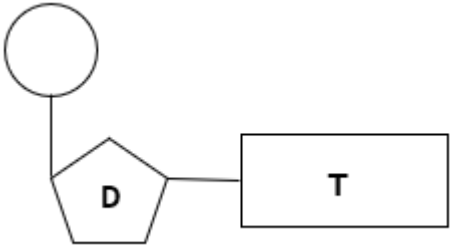
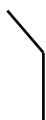
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General Marking Guidance

- 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)	An answer that includes the following points (in order): • phosphodiester (1) • condensation (1) • water (1) • hydrogen (1) • double helix (1)	ACCEPT covalent ACCEPT polymerisation ACCEPT H₂O ACCEPT H DO NOT ACCEPT H₂ DO NOT ACCEPT chromosome	(5)

Question number	Answer	Additional guidance	Mark
1(b)	A drawing that includes the following points: • one base, one phosphate, one sugar, two bonds (1) • all joined together correctly (1) • the base is thymine and the sugar is deoxyribose (1)	 ACCEPT  for the bond joining phosphate to sugar ACCEPT phosphate and base the other way round sugar shape + T and P	(3)

Question number	Answer	Mark
2(a)(i)	The only correct answer is B <i>A is incorrect as the arrow labelled Q is the activation energy</i> <i>C is incorrect as the arrow labelled Q is the activation energy</i> <i>D is incorrect as the arrow labelled Q is the activation energy</i>	(1)

Question number	Answer	Mark
2(a)(ii)	The only correct answer is C <i>A is incorrect as monophenol is the reactant and is located at Y</i> <i>B is incorrect as monophenol is the reactant and is located at Y</i> <i>D is incorrect as monophenol is the reactant and is located at Y</i>	(1)

Question number	Answer	Mark
2(a)(iii)	The only correct answer is C <i>A is incorrect as P will stay the same and Q will get shorter as the activation energy decreases</i> <i>B is incorrect as P will stay the same and Q will get shorter as the activation energy decreases</i> <i>D is incorrect as P will stay the same and Q will get shorter as the activation energy decreases</i>	(1)

Question number	Answer	Additional guidance	Mark
2(b)(i)	- tangent drawn at 3 minutes on the outside of the curve (1) - value between 6.5 and 12.6 to max one decimal place (1)	ACCEPT with or without a minus sign Bald correct answer = 2 marks (answer / bald answer} in range but with too many decimal places = 1 mark	(2)

Question number	Answer	Additional guidance	Mark
2(b)(ii)	An explanation that includes two of the following points: • {curve / gradient / graph / fall} will be steeper and {plateau / reach zero sooner} (1) • (optimum temperature results in) more {energy / collisions / enzyme-substrate complexes} (1) • (levels off sooner) substrate will run out (1)		(2)

Question number	Answer	Additional guidance	Mark
3(a)	• 98 (g of protein per person) (1) • 686 (g) (1)	Bald answer of 686 = 2 marks Bald answer of {98 / number with the adjacent numbers 686} = 1 mark	(2)

Question number	Answer	Additional guidance	Mark
3(b)(i)	• transcription and translation (1)		(1)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	A description that includes four of the following points: mRNA • is a copy of the (genetic) {code / information / sequence / DNA / gene} (1) • mRNA {moves / carries code} {out of the nucleus / to the ribosomes} (1) tRNA • {binds to / carries} its specific amino acid (1) • (tRNA) anticodon {binds / pairs} with (mRNA) codon (1) • holds the amino acid {in place / until the peptide bonds have formed} (1)	ACCEPT appropriate / particular / a certain	(4)

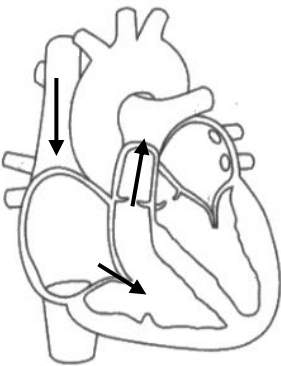
Question number	Answer	Additional guidance	Mark
4(a)	• (India) 71.76 (million) (1) • (Malaysia) 3.2 (1)		(2)

Question number	Answer	Additional guidance	Mark
4(b)(i)	• {16.75 / 16.8 / 17} : 1 (1)		(1)

Question number	Answer	Additional guidance	Mark
4(b)(ii)	An explanation that includes the following points: • because colour blindness is {sex-linked / sex-linkage} (1) • which means the {gene for colour vision / colour blind gene} is located on the X chromosome (1) • therefore males with {faulty / recessive / colour blind} allele will be colour blind (1) • whereas females need to {be homozygous recessive / have two faulty alleles} to be colour blind (1)	ACCEPT X-linked ACCEPT {genetic information / allele} for {colour vision / this disorder} if dominant and recessive alleles shown on X chromosomes in a diagram	(4)

Question number	Answer	Additional guidance	Mark
5(a)(i)	all the {components / molecules / substances} (of the blood) flow (through the vessels) together (1)	ACCEPT - when blood flows from high pressure to low pressure - movement of fluids down a pressure gradient IGNORE temperature {bulk transport of substances /all substances} move in same {direction / speed} - movement of all substances from one exchange surface to another	(1)

Question number	Answer	Additional guidance	Mark
5(a)(ii)	An explanation that includes the following points: • diffusion is too slow (to supply the cells with glucose) (1) ONE FROM THE FOLLOWING : • cells are too far away from the {gut / small intestine / digestive system} / diffusion distance is too great OR • because the concentration gradients (between cells and blood) are too low OR • glucose cannot enter without a carrier protein (1)	ACCEPT because glucose is {large / polar} glucose cannot enter without {facilitated diffusion / active transport / co transport}	(2)

Question number	Answer	Additional guidance	Mark
5(b)	A drawing that includes the following points: • arrows drawn on the RHS of heart only (1) • arrows through a vein, passing into ventricles and leaving through an artery (1)	 The diagram shows a frontal view of the human heart. Three arrows are drawn on the right side of the heart (the patient's right side). One arrow points down into the superior vena cava. A second arrow points up from the inferior vena cava into the right atrium. A third arrow points down from the right ventricle into the pulmonary artery. These arrows illustrate the flow of deoxygenated blood through the right side of the heart.	(2)

Question number	Answer	Additional guidance	Mark
5(c)	An explanation that includes four of the following points: - pressure decreases the {further away from the blood gets from the heart / closer the blood gets to the cells / as the arteries decrease in size} (1) AND THREE OF THE FOLLOWING: - collagen needed for strength in large arteries (1) - elastin needed in large arteries for (elastic) recoil (1) {elastin / (elastic) recoil / collagen} is needed to prevent {rupturing / damaging} arteries (1) - smooth muscle needed in small arteries to {maintain blood pressure / control blood flow / vasoconstriction} (1)	ACCEPT high pressure in large arteries / low pressure in small arteries ACCEPT elastic fibres	(4)

Question number	Answer	Mark
5(d)(i)	The only correct answer is B <i>A is incorrect as arteries decrease in diameter as they get smaller and veins increase in diameter as they get larger</i> <i>C is incorrect as arteries decrease in diameter as they get smaller and veins increase in diameter as they get larger</i> <i>D is incorrect as arteries decrease in diameter as they get smaller and veins increase in diameter as they get larger</i>	(1)

Question number	Answer	Mark
5(d)(ii)	The only correct answer is B <i>A is incorrect as only capillaries are permeable</i> <i>C is incorrect as only capillaries are permeable</i> <i>D is incorrect as only capillaries are permeable</i>	(1)

Question number	Answer	Mark																								
6(a)	<table><tr><th rowspan="2">Structure</th><th colspan="4">Structure found in</th></tr><tr><th>amylose only</th><th>amylopectin only</th><th>both amylose and amylopectin</th><th>neither amylose nor amylopectin</th></tr><tr><td>glycosidic bonds</td><td>[x]</td><td>[x]</td><td>☒</td><td>[x]</td></tr><tr><td>1-6 α bonds</td><td>[x]</td><td>☒</td><td>[x]</td><td>[x]</td></tr><tr><td>hydrogen bonds</td><td>[x]</td><td>[x]</td><td>☒</td><td>[x]</td></tr></table>	Structure	Structure found in				amylose only	amylopectin only	both amylose and amylopectin	neither amylose nor amylopectin	glycosidic bonds	[x]	[x]	☒	[x]	1-6 α bonds	[x]	☒	[x]	[x]	hydrogen bonds	[x]	[x]	☒	[x]	(3)
Structure	Structure found in																									
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glycosidic bonds	[x]	[x]	☒	[x]																						
1-6 α bonds	[x]	☒	[x]	[x]																						
hydrogen bonds	[x]	[x]	☒	[x]																						

Question number	Answer	Additional guidance	Mark
6(b)	A description that includes the following points: - as temperature increases the loss of amylose increases (in all four sources) (1) { most amylose is lost from cassava / least amylose lost from potato } (at all three temperatures) (1)		(2)

Question number	Answer	Additional guidance	Mark
6(c)(i)	An answer that includes three of the following with at least one similarity and one difference: Similarities: • (an increase in temperature causes an) increase in amylose and amylopectin loss (up to 85 and then a decrease) (1) • {the same temperature / a temperature of 85 (°C) causes highest loss of amylose and amylopectin (1) • both lose same quantity at {47 / 64 (°C)} (1) Differences: • amylopectin starts to be lost at lower temperatures (1) • more amylopectin is lost than amylose (overall / above 64°C / except between 47°C and 64°C) (1)	ACCEPT positive correlation (up to 85 (°C)) ACCEPT amylopectin starts to be lost at 20 (°C) and amylose at {40 / just above 40 (°C)} amylopectin lost at greater range of temperatures a temperature of {40 / just above 40 (°C)} causes a loss of amylose but a temperature of 20 °C causes a loss of amylopectin	(3)

Question number	Answer	Additional guidance	Mark
6(c)(ii)	An answer that includes three of the following points: • (water containing) amylose had the higher hardness and (water containing) amylopectin had the higher stickiness OR • (water containing) amylose and amylopectin has the higher (overall) hardness and stickiness (1) • (water containing) amylose contributes to hardness (1) • (water containing) amylopectin contributes to stickiness (1) • no {error bars / standard deviation} so data may not be repeatable (1)	ACCEPT increases ACCEPT increases	(3)

Question number	Answer	Additional guidance	Mark
6(c)(iii)	An answer that includes the following points: • (lid on) so that {cooking fluid / water} is not lost / so more water will be absorbed by rice (1) • so that the {hardness / stickiness} is {desired / correct} (1) OR • (all liquid absorbed) no loss of amylose (1) • so that the {desired / correct} hardness is achieved (1) OR • (all liquid absorbed) no loss of amylopectin (1) • so that the {desired / correct} stickiness is achieved (1)		(2)

Question number	Answer	Additional guidance	Mark
7(a)	A description that includes the following points: (for) as blood cholesterol levels increase (up to a point) the number of people developing heart disease increases / at high cholesterol levels more people have heart disease (1) (against) people with low levels of cholesterol are developing heart disease (1)	ACCEPT at (very) high cholesterol levels there are {only people with heart disease / no people who do not have heart disease} ACCEPT {as cholesterol levels increase / at high levels of cholesterol} there are people without heart disease not enough information on the design of the study	(2)

Question number	Answer	Additional guidance	Mark
7(b)	A description that includes the following points: (LDL increases so does the incidence of heart disease) the height of the bars increase at all HDL concentrations_(1) (HDL increases the incidence of heart disease decreases) the bars get smaller at all LDL concentrations (1) (higher the ratio of HDL to LDL the lower the incidence of heart disease) the bars are highest in the back left corner and get smaller towards the front right corner (1)	ACCEPT CVD is high when LDL high and HDL low <u>and</u> CVD is low when HDL is high and LDL is low	(3)

Question number	Answer	Additional guidance	Mark
7(c)(i)	An explanation that includes three of the following points: • because the LDL-R will {bind / fit} to the LDL (1) • and hold it on the {membrane / cell} (1) • membrane forms a vesicle (around the LDL) (1) • due to the fluidity of the membrane (1)	ACCEPT they are complementary ACCEPT description e.g. membrane surrounds the LDL ACCEPT because phospholipids can move (within membrane)	(3)

Question number	Answer	Additional guidance	Mark
7(c)(ii)	An explanation that includes two of the following points: • because the change in pH will change the ionisation of the R groups (1) • so the {binding site / receptor / protein / LDL} will {change shape / denatures} (1) • therefore bonds holding LDL and LDL-R break (1)	ACCEPT charges of R groups ACCEPT active site {H bonds / ionic bonds} {break / form} within {LDL / LDL-R}	(2)

Question number	Answer	Additional guidance	Mark
7(c)(iii)	An explanation that includes three of the following points: - because mutation results in a change the (tertiary) structure of the {receptor / protein / LDL-R} (1) - therefore the LDL-R will no longer {fit / bind} to LDL / endocytosis will not occur (1) - so less LDL is taken into the {cells / liver} / so LDL remains in the blood (1) - and therefore there will be more {cholesterol / LDL} (in the blood) to {bind to any damaged endothelial cells / build up in the walls of the arteries} (1)	ACCEPT {fewer / no} receptors different protein formed active site ACCEPT no longer complementary ACCEPT LDL increases in blood ACCEPT to form {plaque / atheroma} (in the walls of the arteries)	(3)

Question number	Answer	Additional guidance	Mark
8(a)(i)	- total number of deaths in one year calculated (correctly rounded) (1) {6 / 5.8 / 5.77} $\times 10^7$ (1)	57.74193548387 million / $5.774193548387 \times 10^7$ Bald correct answer = 2 marks Bald answer of total number of deaths in one year correctly rounded = 1 mark	(2)

Question number	Answer	Additional guidance	Mark
8(a)(ii)	An answer that includes the following points: • by plotting the {CVD deaths per year / data (available)} OR • inputting {CVD deaths per year / (available) data} into a computer OR • by {looking at / calculating} the {percentage / rate of} increase / current trends (1) • and extrapolating (the data) (1)	ACCEPT using a graph of the data ACCEPT a description of extrapolation e.g. draw a line of best fit through data	(2)

Question number	Answer	Additional guidance	Mark
8(b)(i)	An explanation that includes the following points: • because the antioxidants will reduce free radicals (1) • therefore {cell damage / damage to lining of blood vessels / oxidative stress} will be {reduced / prevented} (1) • (less cell damage / antioxidants) {reduce/ prevent} {plaque / atheroma} formation (1)	ACCEPT neutralise / donate electrons to / break down / stabilise ACCEPT reduces cholesterol build up	(3)

Question number	Answer	Additional guidance	Mark
8(b)(ii)	• not harmful / food source / already in diet (1)		(1)

Question number	Answer	Additional guidance	Mark
*8(b)(iii)	Indicative content: For repeatable data: • a large group of people (500 minimum) should be selected (D) • study could be repeated (D) • uses same methods for all {groups / trials} (D) For valid data: • people should be selected who have no underlying health risks (D) • other CVD risk factors should be controlled (D) • use of medication should be controlled (D) • as they should all have similar risk profiles (E) • e.g. shouldn't smoke as this would increase blood pressure (E) • diet should be controlled (D) • so that they are consuming the same number of free radicals (E) • so that they are consuming the same number of antioxidants (E) • so that they are consuming the same {cholesterol / HDL / LDL} • the ginger should be administered in a palatable and regular way (D) • so that everyone is getting the same mass of ginger (E) • one group of people should be given a placebo / known antioxidant (D) • to {act as a comparison to / to determine} the effect of the ginger (E) • people should be monitored for the development of CVD over a number (5 minimum) of years (D) • because CVD takes a period of time to develop (E) • use of statistical analysis / t-test / other relevant named stats test (D) • to check repeatability (E)	Level 1: Description of study design 1 mark = one appropriate description 2 marks = three appropriate descriptions Level 2: Description of study design (that will work) with some explanations 3 marks = three appropriate descriptions plus an indication that the study needs to be long term OR one description explained or linked correctly to either validity or repeatability 4 marks = two descriptions explained or linked correctly to both validity and repeatability Level 3: Descriptions with detailed explanations 5 marks = three descriptions explained 6 marks = at least three descriptions explained, including an indication that the study needs to be long-term with a reason	(6)

