GradeMax



Mark Scheme (Results)

October 2021

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

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October 2021
Question Paper Log Number P67102A
Publications Code WBI11_01_2110_MS
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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)	C The only correct answer is C. *A is incorrect because amino acids are not found in DNA* *B is incorrect because a mutation is a change in DNA* *D is incorrect because there are no bases in protein*	**(1)**

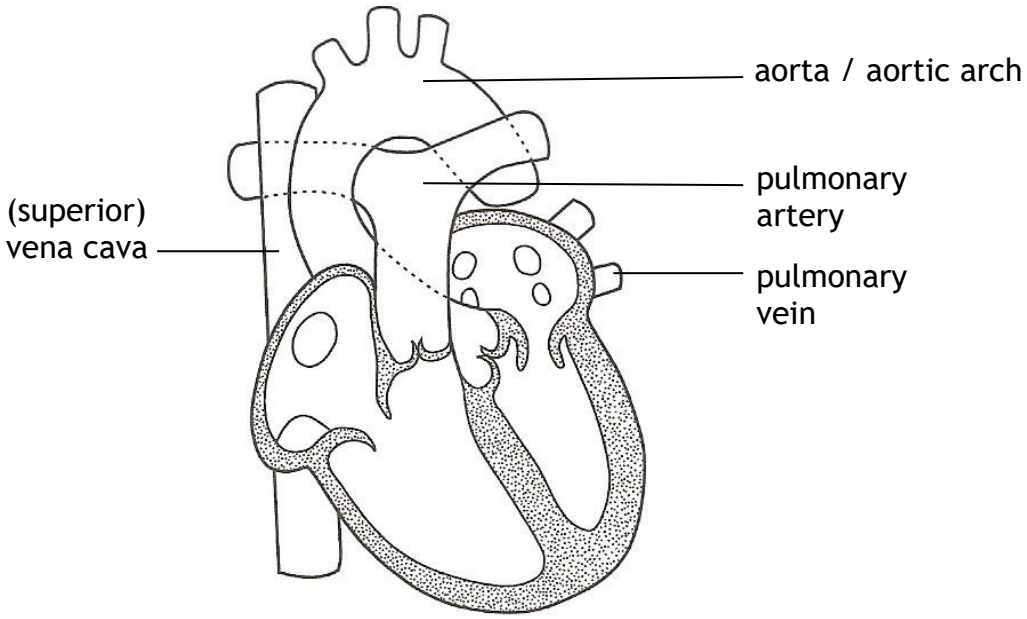
Question number	Answer	Additional guidance	Mark
1(b)	Any two from: deletion insertion substitution (1)	**ALLOW** {chromosome **/** translocation} {point / gene} and {chromosome **/** translocation} **IGNORE** subtraction / addition / swapping / frameshift / nonsense / duplication / specific examples	**(1)**

Question number	Answer	Additional guidance	Mark
1(c)	An answer that includes three of the following points: • as age increase the number of cases increases (in both males and females) (1) • up to 57 years of age {males and females have a similar number of cases / females have a higher incidence} (1) • above 57 the number of cases is higher in males (1) • onset of cancer is later in males than females (1)	**ACCEPT** converse where appropriate **ACCEPT** men and women throughout **ACCEPT** positive correlation **IGNORE** risk for cases **ACCEPT** 58 **ACCEPT** 58 **NB** penalise wrong age once **IGNORE** just figures quoted	**(3)**

Question number	Answer	Additional guidance	Mark
2(a)(i)	An answer that includes the following points: • thromboplastin (1) • active site (1) • platelets / (red / white) blood cells / erythrocytes (1)	**IGNORE** calcium ions / Ca^{++} **IGNORE** clot / scab	**(3)**

Question number	Answer	Mark
2(a)(ii)	**A** The only correct answer is **A**. ***B** is incorrect because antihypertensives are used to lower blood pressure* ***C** is incorrect because platelet inhibitors affect platelets* ***D** is incorrect because statins lower blood cholesterol*	**(1)**

Question number	Answer	Additional guidance	Mark
2(b)	• tangent drawn at 2 days (1) • correct answer up to 2 decimal places and units (1)	**Example of calculation:** **ACCEPT** straight line touching outside of curve at 2 **ACCEPT** in range of 2.7 to 4.5 {s day^{-1} / s per day / s/day} **ACCEPT** with or without a minus sign	**(2)**

Question number	Answer	Additional guidance	Mark
3(a)		**IGNORE** ascending / descending **DO NOT ACCEPT** inferior All 4 correct for 3marks 3 correct for 2 marks 1 or 2 correct for 1 mark	**(3)**

Question number	Answer	Mark
3(b)		(3)

Structures	Present in arteries only	Present in capillaries only	Present in veins only	Present in arteries, capillaries and veins
Lining of endothelial cells				X
Valves along the length of the blood vessel			X	
Wall only one cell thick		X		

Question number	Answer	Additional guidance	Mark
3(c)	An answer that includes the following points: • {velocity / (blood) flow} decreases as blood flows through the arterioles (1) • {velocity / (blood) flow} low as blood flows through the capillaries (1) • {velocity / (blood) flow} increases as blood flows through the venules (1)	**NB** penalise ref to blood pressure instead of blood flow once **ACCEPT** from arteries to capillaries **IGNORE** descriptions of what happens in arteries **ACCEPT** slight increase **IGNORE** constant **ACCEPT** from capillaries to veins **IGNORE** descriptions of what happens in veins	**(3)**

Question number	Answer	Mark
4(a)(i)	**B** The only correct answer is **B**. ***A** is incorrect because fructose is a monosaccharide* ***C** is incorrect because both glucose and fructose are monosaccharides* ***D** is incorrect because fructose is a monosaccharide*	**(1)**

Question number	Answer	Mark
4(a)(ii)	**C** peptide | condensation The only correct answer is **C**. ***A*** *is incorrect because ester bonds are in lipids* ***B*** *is incorrect because ester bonds are in lipids and hydrolysis splits bonds* ***D*** *is incorrect because hydrolysis splits bonds*	**(1)**

Question number	Answer	Mark
4(a)(iii)	**B** absent | lower The only correct answer is **B**. ***A*** *is incorrect because saturated fatty acids have more hydrogens than unsaturated fatty acid of same length* ***C*** *is incorrect because there are no carbon carbon double bonds in saturated fatty acids* ***D*** *is incorrect because there are no carbon carbon double bonds in saturated fatty acids*	**(1)**

Question number	Answer	Additional guidance	Mark
4(b)(i)	• volume of cylinder calculated (1) • ratio of surface area : volume to max 2 dps (1)	**Example of calculation:** (3 × 2 × 2 × 28 / π × 2 × 2 × 28 / $^{22}/_{7}$ × 2 × 2 × 28) 336 / 352 (mm^3) e.g 1.02 : 1 / 1.07 : 1 / 1 : 1 **ACCEPT** ratio given the wrong way round e.g. 1 : 09 **NB** ecf if {incorrect rounding from above / diameter used} for 1 mark	**(2)**

Question number	Answer	Additional guidance	Mark
4(b)(ii)	An explanation that includes two of the following points: • (because the insect is small) the cells will not be far from the {sinuses / blood} (1) • (so) diffusion can supply the {oxygen / nutrients / named nutrient} (from the blood) (1) • because the insect is small it does not have {double circulation / blood vessels / closed circulatory system / complex circulatory system / high pressure} **OR** • because the insect has a low {metabolic rate / oxygen demand} (1) • diffusion can supply the oxygen (from blood / tracheoles) / the oxygenated and deoxygenated blood <u>does not need to be kept separate</u> (1) • because the insect is small it does not have {double circulation / blood vessels / closed circulatory system / complex circulatory system / high pressure}	**IGNORE** ref to surface area to volume ratio **ACCEPT** small diffusion distance between cells and {sinuses / blood} **ACCEPT** remove carbon dioxide diffusion supplies oxygen to cells from the tracheoles **IGNORE** has an open system because this is in the question **IGNORE** has an open system because this is in the question	**(2)**

Question number	Answer	Additional guidance	Mark
4(b)(iii)	A description that includes two of the following points: • fibrous protein (1) • {triple / three stranded} helix (held with hydrogen bonds) (1) • (short) repeating sequences of amino acids / high {hydroxyproline / proline / glycine} content / every third amino acid is glycine (1)	**IGNORE** refs to secondary / tertiary / quaternary structure throughout **NB** piece together **IGNORE** alpha	**(2)**

Question number	Answer	Additional guidance	Mark
5(a)	An explanation that includes the following points: • because the rate of miscarriage increases with (increase in) age (1) • there is no evidence age is causing the miscarriage (1)	**ACCEPT** directly proportional to each other it shows that an increase in one variable is reflected by an increase in the other variable **ACCEPT** no evidence of causation	**(2)**

Question number	Answer	Additional guidance	Mark
5(b)(i)	An explanation that includes the following points: • aneuploidy results in miscarriage because the screened embryos result in fewer miscarriages (1) • other {factors / named factor} cause miscarriages because {screened embryos / embryos that do not have aneuploidy} are miscarried (1)	**ACCEPT** converse where appropriate **e.g.** age, mutations, the process of implanting embryos, smoking, alcohol, dietary factors **IGNORE** lifestyle / screening causes miscarriage	**(2)**

Question number	Answer	Additional guidance	Mark
5(b)(ii)	An explanation that includes three of the following points: • because no indication of sample size (1) • because no statistics presented (1) • because no idea how many of the unscreened embryos had aneuploidy (1) • other {lifestyles / factors / named factor} not {taken into account / not shown} (1) • false (negative / positive) results (1)	**ACCEPT** small sample size **IGNORE** age / sex	**(3)**

Question number	Answer	Additional guidance	Mark
5(c)	An answer that includes three of the following points: • (preimplantation) screened embryos still result in miscarriages so raising false hopes (1) • issues surrounding the embryos (that have aneuploidy) (1) • false (positive) results resulting in unnecessary {wastage / destruction} of embryos (1) • other (genetic) defects may be found (1)	**DO NOT ACCEPT** {fetus / baby} e.g. discarding the embryos is unethical **ACCEPT** false (negative) result leads to use of that embryo	**(3)**

Question number	Answer	Additional guidance	Mark
6(a)(i)	An answer that includes two of the following points: • (46 / 48 /94 patients is) not a very large sample size (1) • {18 countries / variety of people} probably means that other variables not taken into account (1) • but AHP is a very rare disorder so not many patients available (1)	**IGNORE** refs to reliability, validity **ACCEPT** in the context of 'these' people named variable e.g. lifestyle, diet, other diseases **IGNORE** sex / age	**(2)**

Question number	Answer	Additional guidance	Mark
6(a)(ii)	• mass of drug needed for that patient (1) • {0.8 / 0.85 / 0.847} cm^3 (1) **OR** • volume of drug to give 2.5 mg (1) • {0.8 / 0.85 / 0.847} cm^3 (1)	**Example of calculation:** 64 × 2.5 / 160 **IGNORE** units **ACCEPT** cc / mls 2.5 ÷ 189 / 0.0132275 **ACCEPT** cc / mls **NB** Bald answer of {0.8 / 0.85 / 0.847} cm^3 = 2 marks Bald answer of {160 / 0.01 / 0.013 / 0.132} = 1 mark	**(2)**

Question number	Answer	Additional guidance	Mark
6(a)(iii)	• 27% of 48 calculated (1) • 12 / 13 (1)	**Example of calculation:** 27 × 48 ÷ 100 / 12.96 **ACCEPT** 25 as an ecf for 1 mark (27% of 94)	**(2)**

Question number	Answer	Additional guidance	Mark
6(b)(i)	G U C U U U C	All correct = 2 marks One wrong base given OR one wrong base given consistently = 1 mark	(2)

Question number	Answer	Additional guidance	Mark
6(b)(ii)	A description that includes three of the following points: • phosphodiester bonds between (adjacent) {ribose and phosphate / (mono)nucleotides} (in each strand) (1) • covalent bonds attaching base to a {ribose (sugar) / sugar} (1) • {hydrogen / H} bonds between (complementary) bases (holding two strands together) (1) • {hydrogen / H} bonds holding double helix together (1)	**ACCEPT** sugar **DO NOT ACCEPT** deoxyribose **ACCEPT** between {C and G / U and A} **DO NOT ACCEPT** between {T and A / other incorrect base pairs} **IGNORE** incorrect number of H bonds	(3)

Question number	Answer	Additional guidance	Mark
6(b)(iii)	An answer that includes three of the following points: • {no / less / affected} translation of the mRNA (1) • (altered mRNA) affects shape of {protein / active site} (1) • {no / less / slower} haem production (1) • {no / less} (toxic) porphyrin (1)	**ACCEPT** a description of translation **DO NOT ACCEPT** transcription / description of transcription **ACCEPT** no {protein / enzyme} formed	**(3)**

Question number	Answer	Additional guidance	Mark
*7(a)	Indicative content: **Graph:** • HDL involved in removal of LDL from blood by liver (SE) • not just level of HDL that influences risk (D) • higher levels of LDL increase risk (D) • risk decreases with increase in HDL (D) • HDL results in uptake of cholesterol by liver (SE) • LDL forms the plaque (SE) • risk is a {combination / ratio} of HDL and LDL levels (SE) • the higher the HDL:LDL ratio the lower the risk (SE) **Other risk factors:** • the more cholesterol in the blood the more cholesterol to build up the atheroma (SE) • high blood pressure increases chance of damage to endothelial cell layer (SE) • smoking causes high blood pressure (SE) • smoking produces CO that binds to haemoglobin putting strain on heart (SE) • high salt in diet causes high blood pressure (SE) • obesity increases risk because of strain put on heart (SE) • age increases risk because affects heart muscle (SE) • genetic predisposition affects risk (SE) **Extended explanation:** • damage to the endothelial layer results in an inflammatory response • damage to the endothelial layer causes {build up of cholesterol / plaque} • plaque causes {more cholesterol to build up / blood clot to form • <u>coronary artery</u> becomes blocked • resulting in less oxygen reaching <u>heart {cells / tissues}</u> • heart attack results as <u>heart cells</u> cannot respire	**Level 1:** **1 mark** = 1 {risk factor named / comment on graph} **2 marks** = 2 {risk factor named / comment on graph} **Or** outline of how cholesterol causes CVD ie recall of the story **Level 2:** **3 marks** = 2 simple explanations **4 marks** = 3 simple explanations **Level 3:** **5 marks** = as for 4 marks + 1 point from extended explanation **6 marks** = as for 5 marks + 2 points from extended explanation	**(6)**

Question number	Answer	Additional guidance	Mark
7(b)(i)	An answer that includes three of the following points, one of which must be a similarity for full marks: Similarities • both contain ApoA-1(1) • both contain a phospholipid layer (1) Differences • altered HDL is larger (1) • altered HDL has more CE (1) • altered HDL has fewer (long-chain polyunsaturated) PC (1)	**ACCEPT** converse throughout **DO NOT PIECE TOGETHER** **ACCEPT** altered HDL has no {ApoM / S1P / RBP4/ CRABP1}	**(3)**

Question number	Answer	Additional guidance	Mark
7(b)(ii)	An explanation that includes the following points: • less reduction (in the number) of free radicals (1) • therefore {cell damage / damage to lining of blood vessels / oxidative stress} will not be reduced (1) • therefore formation of {plaque / atheroma} will not be reduced (1)	**ACCEPT** free radicals will not be {reduced / neutralised} **IGNORE** free radicals won't increase **ACCEPT** {cell damage / oxidative stress} will occur **ACCEPT** more plaques **NB** max 1 mark if not in context of reduced antioxidant properties	**(3)**

Question number	Answer	Additional guidance	Mark
8(a)(i)	A description that includes the following points: • gene is the {length of DNA / sequence of bases} coding for a (poly)peptide (1) • allele is the (different) {version / form / variation} of the gene (1) • gene for feather colour <u>and</u> allele for {white / black} feathers (1)	**ACCEPT** protein / sequence of amino acids **NB** piece together **DO NOT ACCEPT** speckled feathers	**(3)**

Question number	Answer	Additional guidance	Mark
8(a)(ii)	A description that includes the following points: • genotype is the combination of alleles (1) • phenotype is the {(observable) characteristics / appearance / traits} (1) • phenotype is the colour of the feathers <u>and</u> genotype is the presence of white and or black alleles (1)	**ACCEPT** mixture of alleles / the alleles present **DO NOT ACCEPT** genes **ACCEPT** feature / ref to colour of feathers **IGNORE** ref to environment **ACCEPT** phenotype is {white / black / speckled / mixture of black and white} (feathers) genotype is {WW / BB / WB} or any other letters used **NB** piece together	**(3)**

Question number	Answer	Additional guidance	Mark
8(b)	An answer that includes the following points: • parent's genotypes shown as BB and BW (1) • offspring's genotypes shown as BB and BW (1) • number of speckled chicks given as 12 or 13 (1)	**ACCEPT** other letters, including B and b **DO NOT ACCEPT** X and Y B for white and W for black **ACCEPT** other letters, including B and b **CE** from 1 **CE** from 2 provided whole number **NB** Bald answer = I mark	**(3)**

Question number	Answer	Additional guidance	Mark
8(c)(i)	Chi squared (1)	**ACCEPT** Chi square / X squared / x squared / X^2 / x^2 / chi^2 distribution (test) / chi (test) / closeness of fit / goodness of fit **p**honetic spellings e.g kai / cai / khi	**(1)**

Question number	Answer	Additional guidance	Mark
8(c)(ii)	An answer that includes the following points:	All correct = 2 marks One row correct = 1 mark	

Steps in the calculation for the statistics test	Colour of feathers of chicks		
	Speckled	White	Black
Observed number (O)	243	125	112
Expected number (E)	240	120	120
(O-E)	3	5	-8
$\frac{(O-E)^2}{E}$	0.0375 9/240 3/80	0.2083 25/120 5/24	0.5333 64/120 8/15

ACCEPT 8
DO NOT ACCEPT -3 / -5

ACCEPT 2 or 3 or 4 dps but not necessarily consistently the same number.
DO NOT ACCEPT recurring

(2)

Question number	Answer	Additional guidance	Mark
8(c)(iii)	0.8 / 0.78 / 0.779 / 0.7791 (1)	CE / rounding effect from (c)(ii) **DO NOT ACCEPT** 0 NB 187/240 = 0.7792	**(1)**

Question number	Answer	Additional guidance	Mark
8(c)(iv)	An explanation that includes two of the following points: • {calculate / use} the number of degrees of freedom • use (a probability) value of (up to or equal to) 5%/0.05 (1) • compare (calculated) {value / result} to (critical) value (1) • if the (calculated) {value / result} is greater than (critical) value then null hypothesis is rejected (1)	**ACCEPT** description of how to work out degrees of freedom **NB** mp 4 alone = 2 marks **ACCEPT** the converse argument any quoted figures for the calculated value	**(2)**

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