GradeMax



Mark Scheme (Results)

Summer 2021

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

Summary of changes from Provisional Mark Scheme

A few minor changes were made to the Mark Scheme before marking on the marking service began. These have been highlighted in red in the Mark Scheme. The changes have been highlighted in the table:

Question Number	Summary of change
2(c)(i)	**Another way of expressing answer has been added :** **190.9 million**
7(a)	**Mark point amended slightly so that the 'of DNA' goes into smooth brackets**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>Polymer</th><th>Monomer</th><th>Elements in monomer</th><th>Type of bond</th></tr>
<tr><td>Carbohydrates</td><td>monosaccharide</td><td>carbon, hydrogen and oxygen</td><td>glycosidic</td></tr>
<tr><td>Nucleic acids</td><td>(mono)nucleotide</td><td>carbon, hydrogen, oxygen, phosphorus and nitrogen</td><td>phosphodiester</td></tr>
<tr><td>Proteins</td><td>amino acid</td><td>carbon, hydrogen, oxygen, (sulfur) and nitrogen</td><td>peptide</td></tr>
</table>
</td><td>ACCEPT chemical symbols C, H, O

ACCEPT chemical symbols C, H, O, N, S</td><td>(4)</td></tr>
</table>

Question number	Answer	Additional guidance	Mark
1(b)	A description that includes three of the following points: **TWO FROM** • (one) glycerol and three fatty acids (1) • joined by {condensation reaction / ester bond} (1) • by enzymes (1) **AND** • (at least) one fatty acid is {unsaturated / has a CC double bond} (1)		**(3)**

Question number	Answer	Mark
2(a)	**C** glycogen The only correct answer is C. ***A*** *is incorrect because amylopectin is found in plant cells only* ***B*** *is incorrect because cellulose is found in plant cells only* ***D*** *is incorrect because starch is found in plant cells only*	**(1)**

Question number	Answer	Mark
2(b)	**D** lactose and sucrose The only correct answer is D. ***A*** *is incorrect because fructose is a monosaccharide and therefore not digested* ***B*** *is incorrect because fructose and galactose are both monosaccharides and therefore not digested* ***C*** *is incorrect because galactose is a monosaccharide and therefore not digested*	**(1)**

Question number	Answer	Additional guidance	Mark
2(c)(i)	• 190 900 000 / 191 000 000 / 190.9 million / 191 million / 1.909×10^8 / 1.91×10^8		**(1)**

Question number	Answer	Additional guidance	Mark
2(c)(ii)	An explanation that includes three of the following points: • because (prenatal testing) can cause abortion (1) • because false negative or false positive results can be avoided (if patient already has diabetes) (1) • because of issues arising if another genetic condition is found (1) • because an individual could live a healthy life (as only a genetic predisposition) (1) • because of the ethics associated with destroying embryos (IVF) (1)		**(3)**

Question number	Answer	Additional guidance	Mark
3(a)	An explanation that includes the following points: • to widen (the lumen of) the (coronary) artery / (blood) vessel (1) • so that more blood can flow to the heart {cells / muscle} (1) • for respiration (in the heart muscle) / so that heart muscle can contract (1)	**ACCEPT** increase in {diameter / cross-sectional area} **IGNORE** larger / increase in area	**(3)**

Question number	Answer	Additional guidance	Mark
3(b)(i)	An answer that includes the following points: • percentage of one group developing thrombosis calculated (1) • correct difference calculated (1)	1.5% of 800 = 12 **OR** 1.0% of 400 = 4 difference = 8 Correct answer with no working gains two marks	**(2)**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	• blocks the (coronary) {artery / vessel} {so the brain does not get oxygen / causing a stroke}	**ACCEPT** so that the heart muscle does not get oxygen / causing a heart attack	**(1)**

Question number	Answer	Mark
3(b)(iii)	**D** thrombin and thromboplastin The only correct answer is D. ***A*** *is incorrect because prothrombin is inactive* ***B*** *is incorrect because prothrombin is inactive* ***C*** *is incorrect because prothrombin is inactive*	**(1)**

Question number	Answer	Mark
3(b)(iv)	**C** fibrinogen and thromboplastin The only correct answer is C ***A*** *is incorrect because fibrin is insoluble* ***B*** *is incorrect because fibrin is insoluble* ***D*** *is incorrect because other factors are also soluble e.g. thromboplastin*	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)(v)	anticoagulants / platelet inhibitors	**ACCEPT** named anticoagulants / platelet inhibitors **e.g.** heparin, aspirin, warfarin **DO NOT ACCEPT** antihypertensives / statins	**(1)**

Question number	Answer	Additional guidance	Mark
4(a)	7 ☐ and 8 ■ and 9 ◯		**(1)**

Question number	Answer	Additional guidance	Mark
4(b)(i)	A description that includes the following points: • gene is a sequence of bases coding for a {(poly)peptide / sequence of amino acids} + gene for bitter-taste receptor (1) • allele is a {version of the gene / information coded by the gene} + {tasting / not tasting} (receptor) (1)	**ACCEPT** protein **NB Two correct definitions but no examples = 1 mark**	**(2)**

Question number	Answer	Additional guidance	Mark
4(b)(ii)	A description that includes the following points: • genotype is the combination of alleles + {TT / tt / Tt} (1) • phenotype is the {expressed / observable} {characteristic / trait / feature} + {taster / non-taster}	 **ACCEPT** any pair of letters **ACCEPT** characteristic that can be measured {tasting / not tasting} (receptor) **NB Two correct definitions but no examples = 1 mark**	 **(2)**

Question number	Answer	Additional guidance	Mark
4(c)	An explanation that includes the following points: • dominant allele is (having a receptor that) can taste bitter taste (1) • because individuals 1 and 2 were tasters who had children of both phenotypes (1)	 **ACCEPT** children who could taste and children who could not taste	 **(2)**

Question number	Answer	Additional guidance	Mark
4(d)	An explanation that includes the following points: • because individual 6 was a female non-taster (1) • and her father was a taster (1)		 **(2)**

Question number	Answer	Additional guidance	Mark
5(a)	An explanation that includes the following points: • because the mutated gene results in a faulty (CFTR) protein (1) • so chloride ions do not move out of the cells (1) • decreasing the water potential inside the cell (1) • therefore water {leaves the mucus / enters the cells} by <u>osmosis</u> (1)	**ACCEPT** less effective **ACCEPT** reduced movement of chloride ions / sodium ion channel not inhibited / sodium ions not prevented from entering cell **ACCEPT** decreasing {osmotic potential / solute potential} / increasing solute concentration **IGNORE** decreasing water concentration	**(3)**

Question number	Answer	Additional guidance	Mark
5(b)	An explanation that includes five of the following points: • because the mucus blocks the airways (1) • therefore {air flow to lungs / gas exchange} is reduced (1) • because mucus prevents <u>pancreatic</u> enzymes from entering the small intestine (1) • therefore large food molecules not broken down (and cannot be absorbed) (1) • because the mucus prevents sperm passing through the cervix (1) • therefore sperm cannot reach the egg cell (1)	**ACCEPT** duodenum / gut / digestive tract named enzyme secreted by pancreas **ACCEPT** named large food molecule **ACCEPT** reach the {oviducts / fallopian tubes}	**(5)**

Question number	Answer	Mark
5(c)(i)	**C** 40 The only correct answer is C. ***A*** *is incorrect because* ***B*** *is incorrect because* ***D*** *is incorrect because*	**(1)**

Question number	Answer	Additional guidance	Mark
5(c)(ii)	An explanation that includes the following points: • because (the graph shows that) the level of CFTR protein function varies between 3 and 18% (1) • because (the graph shows that) individuals diagnosed with cystic fibrosis have a range in concentration of chloride ions in sweat (1) • therefore the CFTR protein must be affected to different extents (by different mutations) (1)		**(2)**

Question number	Answer	Additional guidance	Mark
6(a)(i)	• 100 (cm)		**(1)**

Question number	Answer	Additional guidance	Mark
6(a)(ii)	An answer that includes the following points: • height^2 calculated (1) • equation rearranged and values substituted in (1) • answer given to {1 decimal place / 3 significant figures} (1)	2.4025 (m^2) / 24025 (cm^2) mass = 36 × 2.4025 / 86.49 86.5 **NB** CE if rounded cm^2 value to 865 000 Correct answer of 86.5 with no working shown should be awarded 3 marks. An answer of 86.49 or 865 000 with no working shown should be awarded 2 marks.	**(3)**

Question number	Answer	Additional guidance	Mark
6(a)(iii)	An answer that includes the following points: • using <u>WHR</u> the two women appear to have the same risk of developing CVD (1) • however using {mass / BMI} female K is at a greater risk (1)		**(2)**

Question number	Answer	Additional guidance	Mark
6(a)(iv)	An explanation that includes the following points: • by the tape being pulled tighter around the waist so the waist value is smaller (1) • by the tape being held loosely around the hips so the hip value is greater (1) • so that the waist to hip ratio is smaller (1)	**ACCEPT** breathing in whilst taking the measurement of the waist **ACCEPT** make the waist measurement smaller and the hip measurement larger **NB** If both methods given but no justification = 1 mark	**(2)**

Question number	Answer	Additional guidance	Mark
6(b)(i)	An answer that includes two of the following points: • the distribution of fat under the skin is not even (1) • exercise will replace fat under the skin with muscle (1) • the woman has had a child (1) • liposuction (1) • lipoedema (affecting the arms) (1)	**ACCEPT** exercising some parts of body will reduce fat / stopping exercise to some parts of body will increase fat	**(2)**

Question number	Answer	Additional guidance	Mark
6(b)(ii)	• moderate	**DO NOT ACCEPT** low / low to moderate	**(1)**

Question number	Answer	Additional guidance	Mark
7(a)	• change in the base {sequence / order} (of DNA)	**ACCEPT** change in the number of chromosomes / damage to chromosome / loss of part of chromosome	**(1)**

Question number	Answer	Additional guidance	Mark
7(b)(i)	• a change in one variable is reflected in a change in another variable	**ACCEPT** a description that only mentions 'change' once **DO NOT ACCEPT** causes / results in	**(1)**

Question number	Answer	Additional guidance	Mark
7(b)(ii)	A description that includes the following points: • incidence of skin cancer increases with (an increase in) age (1) • incidence of skin cancer increases with an increase in the years (1) • males have higher incidence of skin cancer than females (1)	**ACCEPT** converse throughout **ACCEPT** in either context of males or females or both **ACCEPT** in either context of males or females or both	**(3)**

Question number	Answer	Additional guidance	Mark
7(b)(iii)	An answer that includes three of the following points: • as age increase there is more time for mutations to {build up / occur} (1) • people are spending more time in the sun (1) • more UV light reaching the earth's surface (1) • more men have {jobs / hobbies} outside (1) • men have a greater genetic disposition to skin cancer (1)	**ACCEPT** the older you are the more exposure to risk factors / the more cell divisions the more chance of mutations **ACCEPT** an example of why this may happen e.g. going on more holidays in hot countries **ACCEPT** ozone layer depletion **ACCEPT** men smoke more	**(3)**

Question number	Answer	
***7(c)**	Indicative content: Repeatability: • sample size is small • smokers are being studied and their sample size is very small* • no statistical data available • no indication of the location of the individuals (could be a validity comment as well) Validity: • mean age at diagnosis is similar but not identical • there is a greater range of ages for males than females • no indication of the actual ages of the people • so there could be more people at the extremes in one group • no information about other lifestyle factors • e.g. working in polluted environment, living in the city • no information about non-lifestyle factors • e.g. ethnicity • no indication if individuals lived with other smokers (passive smokers) • no indication of how long people been smoking for* • no indication of how many cigarettes were smoked by the smokers each day* • no indication if the non-smokers had ever smoked previously* • no indication of severity of emphysema* • no indication if emphysema is self-diagnosed or clinical diagnosis*	**Level 1 : comments on the design of the study** 1 mark = 1 comment 2 marks = 3 comments **Level 2 : comments on the design of the study** 3 marks = 4 comments, at least one of which is from each category 4 marks = 5 comments, at least one of which is from each category **Level 3 : comments on the design of the study and makes at least one link correctly with repeatability or validity** 5 marks = 5 comments at least one of which is linked to repeatability or validity 6 marks = 6 comments at least one of which is linked to repeatability or validity **and** includes a specific comment about {smoking / emphysema}* **ACCEPT** reproducible / reliable **IGNORE** accurate / precise **(6)**

Question number	Answer	Mark
8(a)(i)	**D** nm The only correct answer is D. ***A*** *is incorrect because cm would be* 1×10^{0} ***B*** *is incorrect because mm would be* 1×10^{-1} ***C*** *is incorrect because μm would be* 1×10^{-4}	**(1)**

Question number	Answer	Mark
8(a)(ii)	**B** Q and T The only correct answer is B. ***A*** *is incorrect because R is a fatty acid and only contains C, H and O* ***C*** *is incorrect because R is a fatty acid and only contains C, H and O, S is cholesterol and only contains C, H and O* ***D*** *is incorrect because S is cholesterol and only contains C, H and O*	**(1)**

Question number	Answer	Mark
8(a)(iii)	**D** S : T The only correct answer is D. ***A** is incorrect because* ***B** is incorrect because* ***C** is incorrect because*	**(1)**

Question number	Answer	Additional guidance	Mark
8(b)	An explanation that includes the following points: • because the sequence of amino acids determine the {tertiary / quaternary} structure of the protein (1) • by determining the {position / type} of bonds that form between the <u>R groups</u> (1) • {hydrophobic / non-polar} {(R) groups / amino acids on (the outside of) the part of the protein that is embedded in the fatty acid tails (1) • {hydrophilic / polar} {(R) groups / amino acids} (on the outside of) the part of the protein that is {amongst the phosphate heads / facing the cytoplasm / facing the aqueous environment} (1)	**ACCEPT** pieced together **ACCEPT** a named bond between R groups	**(4)**

Question number	Answer	
*8(c)	Indicative content: **Molecule E** • enters by osmosis • because it is water • the number of the molecules F, G and H lower the water potential • so E moves down the water potential gradient **Molecule F** • enters by facilitated diffusion • down its concentration gradient • because it is polar and cannot pass through the fatty acid tails • therefore needs a protein to provide a polar channel for it to diffuse through **Molecule G** • enters by diffusion • because it is at a higher concentration outside the cell • and it is non-polar so can pass through the fatty acid tails **Molecule H** • enters by active transport • because it is at a higher concentration inside the cell • and therefore needs ATP and a protein to pump it across the membrane	**Level 1 :** 1 mark = 1 relevant comment 2 marks = 3 relevant comments **Level 2 :** 3 marks = 4 relevant comments for at least **two** molecules 4 marks = 5 relevant comments for at least **two** molecules **Level 3 :** 5 marks = 6 relevant comments for at least **three** molecules 6 marks = 7 relevant comments from all **four** molecules **(6)**

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