Mark Scheme (Results)

October 2020

Pearson Edexcel GCE
In AS (8BI0_02)
Paper 2: Core Physiology and Ecology

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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 explanation that makes reference to three of the following points: • an explanation related to presence or absence of nucleus (1) • an explanation related to cell shape (1) • an explanation related to cell contents (1)	• erythrocytes / red cells have no nucleus to carry more haemoglobin • monocytes have a nucleus to synthesize enzymes / proteins • erythrocytes / red cells have biconcave shape to increase surface area to absorb oxygen • monocytes are larger/ can change shape to engulf pathogens • erythrocytes small to pass through narrow capillaries • erythrocytes / red cells contain haemoglobin to transport oxygen	**(3)**

Question Number	Answer	Additional Guidance	Mark
1 b	An answer that makes reference to the following: • prevent entry of {pathogen / named pathogen} (1)	allow prevent infection	**(1)**

Question Number	Answer	Additional Guidance	Mark
1 c	An answer that makes reference to three of the following points: • PTT can be used to indicate liver disease (1) • difference in mean scores with liver disease takes longer to clot (1)	must state mean / average	**(3)**

	• no overlap between mean and standard deviation therefore significant difference between groups / not due to chance (1)	ACCEPT standard deviation is low for both groups	

(Total for Question 1 = 7 marks)

Question Number	Answer	Mark
2(a)(i)	**The only correct answer is A active transport** ***B*** *is not correct because it does not move substances against a concentration gradient* ***C*** *is not correct because it does not move substances against a concentration gradient* ***D*** *is not correct because it does not move substances against a concentration gradient*	**(1)**

Question Number	Answer	Mark

2(a)(ii)	**The only correct answer is A diffusion** ***B*** *is not correct because non-polar does not use facilitated diffusion* ***C*** *is not correct because non-polar does not use* osmosis ***D*** *is not correct because non-polar does not use transpiration*	**(1)**

Question Number	Answer	Mark
2(b)	**The only correct answer is A fatty acids** ***B*** *is not correct because it is not found in greater concentration in lymph* ***C*** *is not correct because it is not found in greater concentration in lymph* ***D*** *is not correct because it is not found in greater concentration in lymph*	**(1)**
Question Number	**Answer**	**Mark**
2(c)	**The only correct answer is B surface area to volume ratio decreases** ***A*** *is not correct because surface area increases* ***C*** *is not correct because surface area to volume ration does not increase* ***D*** *is not correct because surface area to volume ration does not stay constant*	**(1)**

Question Number	Answer	Additional Guidance	Mark
2 (d)	An explanation that makes reference to four of the following points: • large surface area (1) • because of many tracheoles and alveoli (1) • short distance for diffusion (1) • because alveoli and tracheoles have thin walls (1) • moist to allow gases to dissolve (1)	IGNORE thin membranes ACCEPT because tracheoles penetrate tissue, alveoli close to blood capillaries	**(4)**

(Total for Question 2 = 8 marks)

Question Number	Answer	Additional Guidance	Mark
3 (a)	• ***Ammophila*** (1)	reject Ammophila arenaria	**(1)**

Question Number	Answer	Additional Guidance	Mark
3 (b)(i)	• measurements of line AB and correct units (1) • calculation of magnification (1)	= 51 mm allow 50-52 mm ÷ 4mm = allow 12.75 allow range 12.5 -13 Correct answer gains full marks	**(2)**

		allow 1 mark for dividing by 4	

Question Number	Answer	Additional Guidance	Mark
3 (b)(ii)	An explanation that makes reference to two of the following points: • curved leaves so stomata are on inside of leaf {decrease concentration gradient /increase humidity} (1) • hairs reduce air movement (1) • stomata in pits to {increase humidity / decrease concentration gradient} (1)	ACCEPT reduces transpiration rate	**(2)**

	• (thick) waxy cuticle reduces water evaporation/ loss (from outer surface)(1)		

Question Number	Answer	Additional Guidance	Mark
3 (b)(iii)	An explanation that makes reference to two of the following points: • because it transports minerals (to the cells) (1) • because it transports water (to the cells) (1) • to support leaves to absorb light (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
3 (c)	An explanation that makes reference to two of the following points: • the water potential in soil solution will be higher (1) • so that water can be taken up from the sand / water not lost from roots {down a water potential gradient / by osmosis} (1)	IGNORE references to water concentration	**(2)**

(Total for Question 3 = 9 marks)

Question Number	Answer	Mark
4(a)	**The only correct answer is C phylum** ***A*** *is not correct because it is not the largest group* ***B*** *is not correct because it is not the largest group* ***D*** *is not correct because it is not the largest group*	**(1)**

Question Number	Answer	Mark
4(b)	**The only correct answer is D organisms produce many more offspring than survive** ***A*** *is not correct because all organisms do not have enough resources to survive* ***B*** *is not correct because individuals in the same population do not show little variation* ***C*** *is not correct because individuals do not inherit acquired characteristics*	**(1)**

Question Number	Answer	Mark
4(c)	**The only correct answer is B** produce fertile offspring ***A*** *is not correct because same species do not produce hybrid offspring* ***C*** *is not correct because same species do not always live in same location* ***D*** *is not correct because same species do not have no genetic variation*	**(1)**

Question Number	Answer	Mark
4(d)	**The only correct answer is A DNA** ***B*** *is not correct because lipids are not used in classification* ***C*** *is not correct because polysaccharides are not used in classification* ***D*** *is not correct because vitamins are not used in classification*	**(1)**

Question Number	Answer	Additional Guidance	Mark
4 (e)(i)	An explanation that makes reference to four of the following points: • some head lice are resistant to one insecticide (1) • due to a mutation (1) • these resistant head lice survive and reproduce (1) • pass on {allele / gene} for resistance to offspring (1) • resulting in an increase in allele frequency in population (1)	IGNORE reference to **immune** ALLOW not killed and reproduce not just pass on resistance	**(4)**

Question Number	Answer	Additional Guidance	Mark
4 (e)(ii)	An explanation that makes reference to the following points: • use an insecticide that has not been used before / different insecticide (1) • so no {resistance / selection pressure} (1) • insecticide regularly changed so no resistance develops to any one type (1)	IGNORE immune	**(3)**

(Total for Question 4 = 11 marks)

Question Number	Answer	Additional Guidance	Mark
5 (a)	An answer that makes reference to similarities • contain {fluid medium / blood} and {pump / heart } and {tubes or vessels} (1) and two of the following differences • heart has 1 or 2 chambers, double circulation has 3 or 4 chambers (1) • blood passes {through the heart} once per circulation, double circulation blood passes {through the heart} twice (1) • oxygenated and deoxygenated blood not separated, double circulation they are separated (1)		**(3)**

	• pressure is lower (due to delicate nature of gills) in single circulation (1) • single circulation is less effective at {delivering oxygen / removing carbon dioxide} (1)		

Question Number	Answer	Additional Guidance	Mark
5 (b)	An answer that makes reference to four of the following: • choose 10 plus of each sex of {same age fitness level / mass / free from any heart condition} (1) • obtain (mean) resting rate for each person (1) • measure heart rate after exercise until heart rate returns to normal resting rate (1)		

	• record time taken in until heart is at resting rate (1) • standardisation of {type of exercise / duration of exercise / temperature of room / time of day} (as this might affect the heart rate) (1) • compare means (and standard deviations) (1)	**ALLOW compare averages**	**(4)**

(Total for question 5 = 7 marks)

Question Number	Answer	Additional Guidance	Mark
6(a)(i)	An answer that makes reference to : • axes the correct way around with linear scale and labelled {concentration of sucrose and distance or S or sag} (1) • correct units sucrose concentration mol dm^{-3} and S mm (1) • points plotted correctly and joined (dot to dot) (1)	Allow dot to dot or smooth curve allow points plotted on non linear scale	**(3)**

Question Number	Answer	Additional Guidance	Mark
6(a)(ii)	a calculation showing the following steps • calculation of difference between 0.2 and 0.4 • calculation of mean relationship	=7.5mm 7.5 ÷ 0.2 = 37.5 allow one mark for 7.5	**(2)**

Question Number	Answer	Additional Guidance	Mark
6(a)(iii)	An explanation that makes reference to the following points : • as concentration increases S increases (1)		**(4)**

	• At / above 0.2 mol the potato starts to lose water as water potential of potato higher than solution (1) • so (as water leaves cells) tissues turgor is lost so more S / distance / sag (1) • little change in S above 0.45 mol (as little water loss) (1)	new MP for overall analysis ignore incorrect ref to turgor increasing for this mp possibly delete these mps	

Question Number	Answer	Additional Guidance	Mark
6(b)	An answer that makes reference to two of: • reference to repeats / calculation of mean (1) • no reference to from same type potato / same temperature / same mass of potato (1) • difficult to measure sag /parallax / how clamped / sag may be due to other reasons (1)		**(2)**

(Total for question 6 = 11 marks)

Question Number	Answer	Additional Guidance	Mark
7(a)(i)	An explanation that makes reference to four of the following: • damage to endothelium / lining (1) • therefore inflammatory response occurs (1) • therefore formation of {atheroma / plaque } in arteries (1) • therefore arteries are narrowed which reduces {blood flow / oxygen supply / glucose supply} • leads to (further) increase in blood pressure (1)	must mention arteries once Ignore blocked	**(4)**

Question Number	Answer	Additional Guidance	Mark
7(a)(ii)	An answer that makes reference to three of the following: • smoking damages arteries lining (1) • type 2 diabetes increases blood pressure (1) • high cholesterol / LDL levels increase therefore formation of {atheroma / plaque } in arteries (1) • lack of exercise / high fat diet (leads to obesity) (1) • inherited alleles from parents who had cvd (1)	ALLOW Sex / sex hormones / men more likely to develop arthrosclerosis ALLOW Age older more likely to develop arthrosclerosis	**(3)**

Question Number	Answer	Additional Guidance	Mark
7(a)(iii)	• mean of percentages calculated (1) • number of deaths calculated (1)	8.77 ÷ 2 = 4.385 (4.385×12 000)÷100 = 526 correct answer gains full marks allow one mark for x 12000 ÷100 or for x 6000 ÷ 100 or 4.29 % of 6000 = 257.4 and 4.48 % of 6000 = 268.8 = 526	**(2)**

Question Number	Answer	Additional Guidance	Mark
7(b)	An answer that makes reference to four of the following yes as • 100 mg a high enough dose to benefit from reduced heart disease (1) • large study (1) • long time frame (1) no as • is 100 mg a low enough dose to prevent intestinal bleeding / may cause bleeding (1) • little difference between death rate between groups risk decreases by 2 in 1000 ie 0.2% (1) • but twice the levels of (gastrointestinal) bleeding (so no benefit) (1) • no effect on incidence of strokes (1) • no other lifestyle information provided / different patients had different risk factors (1)	at least one from yes / and no	**(5)**

	• no information on cause of death (1)		

(Total for question 7 = 14 marks)

Question Number	Answer	Additional Guidance	Mark
8(a)	An explanation that makes reference to the following: • number of different {species} within a habitat / richness / relative number of each one {species} / {species} evenness (1) • genetic variation (within a species) / heterozygosity / degree of inbreeding (1)	not just numbers of organisms	**(2)**

Question Number	Answer	Additional Guidance	Mark
8(b)(i)	• calculation of N (N-1) (1) • calculate ∑ n (n-1) (1) • calculation of D (1)	N = 126 N (N-1) = 15750 6320+506+182+72=7080	**(3)**

		15750 ÷ 7080 = 2.2 allow 2.23 or 2.225 or 2.2246 allow 1 mark for 6320+506+182+72 and allow 1 mark for 1570	

Question Number	Answer	Additional Guidance	Mark
8(b)(ii)	An explanation that makes reference to the following: • smaller number of different species within this pond / low species richness so that N is lower (1) • few of some species whilst others are very {abundant / low species evenness} so that n is higher (1)	must refer to some species high numbers **and** other species low numbers	**(2)**

Question Number	Indicative content
***8c**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. <u>benefits of in-situ</u> It doesn't involve removing species from their natural ecosystems. It doesn't lead to behavioral change stereotypy It is not as disruptive as ex situ conservation, i.e. ecological integrity is maintained. It involves protection of larger populations and conservation of organisms and their habitat as a whole. The organisms/species get the opportunity to evolve. Allows and facilitates scientific studies of the area. Encourages Ecotourism <u>risks of in-situ</u> It requires larger areas Animals are always under threat of several diseases or any natural disasters. Risk of increased inbreeding and thus reduced fitness which is known as homozygosity. The animal species could be less productive and thus expensive to be monitored and maintained.

	Poachers and ecological tourists may find these thriving habitats as an opportunity and may cause harm. <u>benefits of ex situ</u> It involves protection of species from external threats like predation and poaching. Selective breeding processes are put in place. Can keep breeding logs / studbooks etc It involves reintroduction of several organisms that have left their natural habitat Improvised quality of off-springs can be obtained Many seeds can be stored in seed banks take up little room <u>risks of ex-situ</u> It can be considered only for a few kinds of species. Due to human interference, rare species remain under threat. Inbreeding small population size Hybridization Captive species show divergent genetics/ subject to different selective pressure allele frequencies change. Poor germination rate. Costly method of conservation.

	Harm to seeds by pests

Level	Mark	Descriptor
	0	No awardable content
1	1-2	The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context. explains what in-situ and ex-situ are ***Explains one benefit or risk for one method =1*** ***Explains two benefits or risks for one method or one benefit or risk for each method = 2***
2	3-4	An explanation will be given with occasional evidence of analysis, interpretation and/or evaluation of the scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure. ***Explains two benefits and one risk s for each method = 3*** ***Explains two benefits and two risks for each method = 4***
3	5-6	An explanation is given which is supported throughout by evidence from the analysis, interpretation and/or evaluation of the scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear, coherent and logically structured. ***Explains two benefits and two risks for each method with some evidence of detail = 5***

		Offers an opinion / summary / conclusion of which reflects evidence presented = 6

(Total for question 8 = 13 marks)