Pearson Edexcel

Mark Scheme (Results)

November 2021

Pearson Edexcel GCSE
In Biology (1BI0) Paper 2H

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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.

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.
Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.
When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

Assessment Objective		**Command Word**	
Strand	**Element**	**Describe**	**Explain**
AO1		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

Question Number	Answer	Mark
1 (a)(i)	B non- indigenous species **The only correct answer is B** ***A*** *is not correct because the species in not native* ***C*** *is not correct the species is invasive not non-invasive* ***D*** *is not correct because pathogens are disease causing organisms*	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
1 (a)(ii)	An explanation linking: • competition between species (1) • for resources / named resources (1) **OR** • signal crayfish may carry {microorganisms / parasites} (1) • which causes disease in the indigenous population (1)	 accept for food / habitat accept signal crayfish have a disease	**(2)** **AO2 1**

Question Number	Answer	Mark
1 (a)(iii)	B conservation **The only correct answer is B** ***A*** *is not correct because mutation is a change in DNA* ***C*** *is not correct because predation is eating other animals* ***D*** *is not correct because mutualism is two organisms working together for mutual benefit*	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
1 (a)(iv)	An explanation linking **three** from: • eutrophication causes oxygen levels to decrease (1) • because nitrates levels in the water are increased (1) • causing an overgrowth of algae (1) • which blocks sunlight from the plants **in** the water (1) • plants in the water die and are decomposed (1) • by microorganisms for respiration (1)	ignore nitrogen accept plants on the surface for algae accept plants die because they can't photosynthesise accept decomposers for microorganisms	**(3)** **AO2 1**

(Total for question 1 = 7 marks)

Question Number	Answer	Additional guidance	Mark
2(a)	Any **one** from: bacteria / fungi / decomposers / prokaryotes	 accept microorganisms accept named decomposing organisms e.g. worms	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
2(b)	A description including **two** from: • (dissolved) in water (1) • diffusion through the root (1) • (so water moves) through the xylem (1) • by transpiration (stream) (1) • into leaves by diffusion (1)	 accept active transport through the plant reject phloem accept evaporated from the leaves	**(2)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
2(c) (i)	An explanation linking: • as light intensity decreases the number of (small) plants (per m^2) decreases (1) • because the (small) plants will not be able to photosynthesise enough (1)	 accept reverse argument	**(2)** **AO3 1ab**

Question Number	Answer	Additional guidance	Mark
2(c) (ii)	Any **one** from: • same time of day (1) • same meter (1) • same position(s) in area / measure the same size area (1) • same person makes the readings (1) • meter held vertically each time (1)	accept other valid variables that should be controlled	**(1)** **AO3 1ab**

Question Number	Answer	Additional guidance	Mark
2(d)	A description including **three** from: • place a quadrat along a {rope / tape} measure (1) • tape measure to measure along the transect (1) • measure light intensity at different distances (from the wood) (1) • measure the stinging nettles {along the transect / at different light intensities} (1) • way of measuring growth of stinging nettles (in the quadrats) (1)	reject quadrant accept good descriptions of quadrats – e.g. ½ metre wire square accept use a light meter/lux meter accept named examples – e.g. {height / mass/ dry mass / number of leaves / number of plants}	**(3)** **AO3 3a**

(Total for question 2 = 9 marks)

Question Number	Answer	Additional guidance	Mark
3(a)(i)	• a diagram of the cell that reflects its shape and some of the structures (1) • with any **three** cell structures from {nucleus / cytoplasm / membrane / cilia} (3)	ignore a 'textbook' diagram that does not resemble cell A	**(4)** **AO1 2**

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	to {move/waft} {mucus / bacteria / dust}	ignore stop bacteria entering the body / trap bacteria	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	measurement (2.5 – 0 =) 2.5 (cm) (1) calculation (25 ÷ 10 =) 2.5 (mm per minute)	accept 25 (mm) ecf for incorrect reading divided by 10 award full marks for correct answer with no working	**(2)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	A description including: • apparatus set up as the initial investigation (1) • using {no living organisms / glass beads} instead of living organisms (1)	 accept alternatives to glass beads / non living	**(2)** **AO1 1**

(Total for question 3 = 9 marks)

Question Number	Answer	Additional guidance	Mark
4(a)	a labelled line X to either kidney	accept X written on a kidney	**(1)** **AO2 1**

Question Number	Answer	Mark
4(b)	A amino acids **The only correct answer is A** ***B*** *is not correct because sugars are not converted to urea in the liver* ***C*** *is not correct because lipids are not converted to urea in the liver* ***D*** *is not correct because potassium ions are not converted to urea in the liver*	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
4(c)(i)	A description including **two** from: • blood is filtered (in a dialysis machine) (1) • urea moves {out of the blood / into dialysis solution} (1) • by diffusion (1)	accept tube for blood	**(2)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
4(c)(ii)	Any **one** from: • patient B has {kidney failure / disease} which is less advanced than patient A (1) • patient B may have a {better diet / low protein diet} (1)	 accept patient B only just developed kidney disease	**(1)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
4(d)	A description including: • add Benedict's solution (to some dialysis fluid) (1) • {heat / boil / put in water bath} (1) • see if it turns {green / yellow / orange / red} (1)	 accept brown	**(3)** **AO2 2**

Question Number	Answer	Additional guidance	Mark
4(e)	An explanation linking **three** from: • enzymes are specific (1) • their shape is complementary to their substrate (1) • so starch will not fit into the active site (of urease) (1) • so no reaction can take place (1)	 accept amylase only acts on starch	**(3)** **AO2 1**

(Total for question 4 = 11 marks)

Question Number	Answer	Additional guidance	Mark
5(a)(i)	calculation (7.5 x 400 =) 3000 (1) conversion (3000 ÷ 1000 =) 3 (mm)	 ecf using 2.5 for 1 mark award full marks for correct answer with no working	**(2)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	An explanation linking: • the biconcave disc shape (1) • results in a larger surface area (1) • so (more) oxygen can be carried (1)	 accept description of biconcave disc accept (more) oxygen diffused	**(3)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
5(a)(iii)	for oxygen to bind (inside the erythrocyte / red blood cell)	accept to carry oxygen	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
5(b)	An explanation linking **three** from: • water will move into the erythrocyte (1) • by osmosis (1) • down a concentration gradient (1) • causing the erythrocyte to {burst/lyse} (1)	 accept red blood cell for erythrocyte accept from high water concentration to low water concentration	**(3)** **AO2 1**

(Total for question 5 = 9 marks)

Question Number	Answer	Mark
6(a)(i)	B female condom **The only correct answer is B** ***A*** *is incorrect because oral contraception contains hormones* ***C*** *is incorrect because the rhythm (calendar) method does not involve a barrier* ***D*** *is incorrect because the contraceptive implant contains hormones*	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	barrier methods prevent the transmission of STIs	accept STDs / accept named STIs accept for extra protection against pregnancy	**(1)** **AO2 1**

Question Number	Answer	Mark
6(b)(i)	ovary / ovaries	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	An explanation linking **four** from: • inhibits the production of FSH (1) • FSH causes eggs to mature in the follicle / (no FSH means) no eggs will be matured (1) • high levels of progesterone inhibit the production of LH (1) • LH causes ovulation / (no LH) prevents ovulation (1) • if eggs are not matured and released they cannot be fertilised (1)	accept thicker cervical mucus to prevent the sperm from reaching the egg (2)	**(4)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
6(c)	An explanation linking **four** from: **Clomifene (maximum two marks)** • clomifene therapy introduces hormones into the body / stimulates hormones {LH / FSH} (1) • to allow (more) eggs to {develop / be released} (1) **IVF (maximum two marks)** • IVF involves fertilisation outside the body (1) • so a fertilised egg cell can be implanted directly into the uterus (1) • so if Fallopian tubes are blocked there can still be pregnancy (1)	accept womb for uterus accept alternative reasons for using IVF	**(4)** **AO1 1**

(Total for question 6 = 11 marks)

Question Number	Answer	Additional guidance	Mark
7(a)	substitution $124 \div 1.8^2$ (1) evaluation BMI = 38.27	award 2 marks for correct answer with no working accept 38 / 38.3 accept 68.9 / 68.89 for 1 mark accept answers correctly rounded to any number of decimal places	**(2)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
7(b)(i)	A description including: • blood glucose concentration increased from {0 – 8 hours / from 100 to 139 / by 39 mg/dL} (1) • then blood glucose concentration decreased [at 12 hours / to 90 mg/dL / by 49 mg/dL) (1) • blood glucose concentration increased {at 20 hours / after 12 hours / to 134 mg/dL / by 44 mg/dL} (1)	 accept blood glucose concentration increased {at 24 hours / to 137 mg/dL / by 47 mg/dL} accept other calculated increases between 12 and 24 hours	**(3)** **AO3 1 a + b**

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	An explanation linking: • the pancreas produced insulin (1) • but the cells in the {liver / muscles} were resistant to insulin (1) • so glucose was not taken up by the {liver / muscles / cells} (1)	 accept but there is insulin resistance accept so the glucose is not converted to glycogen in the {liver / muscles}	**(3)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
7(b)(iii)	An explanation linking: • the blood glucose concentration decreased (at 12 hours) (1) • because the patient has used up the glucose in his blood (1) • due to increased respiration (during exercise) (1)	 accept glucose used by {muscles / cells}	**(3)** **AO3 2ab**

(Total for question 7 = 11 marks)

Question Number	Answer	Mark
8(a)	C urea into ammonia **The only correct answer is C** ***A*** *is incorrect because this is the role of nitrogen fixing bacteria* ***B*** *is incorrect because this is the role of denitrifying bacteria* ***D*** *is incorrect because decomposers produce ammonia not urea*	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
8(b)(i)	Any **two** from: • temperature (1) • water availability (1) • pH of soil (1) • area of leaves in contact with the soil (1) • {mineral ions / nitrates} in the soil (1) • oxygen concentration (1)	accept humidity accept light intensity (1)	**(2)** **AO2 2**

Question Number	Answer	Additional guidance	Mark
8(b)(ii)	An explanation linking: • repeat the investigation / have more than one tray of each type of leaf (1) • obtain more data / to calculate a mean / identify anomalies (1) **OR** • a variable that can be controlled (1) • **linked to why** this would improve the investigation and make the results more comparable (1)	accept so that the data is more reliable e.g. accept use the same mass for each type of leaf e.g. accept use the same {mass / type} of soil (1) e.g. accept as leaves can be different sizes (1) e.g. accept so that the number of decomposing organisms is the same (1) ignore references to valid / accurate / precise	**(2)** **AO3 3b**

Question Number	Answer	Mark
8(c)(i)	D ash leaves **The only correct answer is D** ***A*** *is incorrect because beech leaves decompose the slowest* ***B*** *is incorrect because oak leaves decay at a slower rate than ash leaves* ***C*** *is incorrect because sycamore leaves decay at a slower rate than ash leaves*	**(1)** **AO3 1a**

Question Number	Answer	Additional guidance	Mark
8(c) (ii)	selection (28.2 – 19.7 =) 8.5 (1) calculation (8.5 ÷ 40 =) 0.213 units grams per day (1)	 accept 0.213 for two marks award one mark for 0.2125 accept g/day	**(3)** **AO1 2**

Question Number	Answer	Additional guidance	Mark
8(d)	An explanation linking: • increasing oxygen concentration increases the rate of decomposition (1) • because there is more respiration (1)	 accept reverse argument	**(2)** **AO2 1**

(Total for question 8 = 11 marks)

Question Number	Answer	Additional guidance	Mark
9(a)(i)	selection (1200 - 800 =) 400 (1) calculation 400 ÷ 1200 = 33.33 (1) significant figures (-) 33%	 ecf for incorrect calculation rounded to a whole number award full marks for correct answer with no working	**(3)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
9(a)(ii)	Any **two** from: • length of exercise (1) • intensity of exercise (1) • type of exercise (1) • BMI of volunteer / body mass of volunteer (1) • diet / food intake (1) • fitness levels (1)	 accept weight / height accept lifestyle similarities	**(2)** **AO2 2**

Question number	Indicative content	Mark
9*(a)(iii)	**AO2** **increased blood flow** • pump more blood • increased blood flow to the heart muscle • increased blood flow to the other muscles • to deliver more oxygen and glucose • for increased respiration • releasing more energy for exercise • to remove more carbon dioxide • to remove more lactic acid • increased blood flow to the skin • to help cool the body **decreased blood flow** • decreased blood flow to the kidney • decreased blood flow to the stomach • to allow more blood to flow to the working muscles **same blood flow** • blood flow to the brain remains the same • as the brain needs a constant amount of oxygen and glucose to function	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic consequences connections made between elements in the context of the question. The lines of reasoning are unsupported or unclear.
Level 2	3–4	The explanation is mostly supported throughout by linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. Lines of reasoning are mostly supported through the application of relevant evidence.
Level 3	5–6	The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. Lines of reasoning are supported by sustained application of relevant knowledge.

Level	Mark	
	0	No rewardable material.
Level 1	1–2	A simple statement, referencing whether the blood through an organ is increased, decreased **OR** remained the same. Linked to a simple explanation.
Level 2	3–4	References to whether blood flow is increased, decreased or remained the same for **TWO** scenarios. Linked to two or more reasons.
Level 3	5–6	References to the blood through organs where it has increased, decreased **AND** remained the same. Linked to the need for more oxygen and glucose to the muscles / heart for increased respiration.

(Total for question 9 = 11 marks)

Question Number	Answer	Mark
10(a)(i)	D ethene **The only correct answer is D** ***A*** *is incorrect because auxins cause growth responses in plants* ***B*** *is incorrect because gibberellins cause germination and flower and fruit formation* ***C*** *is incorrect because sucrose is not a plant hormone*	**(1)** **AO1 1**

Question Number	Answer	Mark
10(a)(ii)	B gibberellin **The only correct answer is B** ***A*** *is incorrect because auxins cause growth responses in plants* ***C*** *is incorrect because sucrose is not a plant hormone* ***D*** *is incorrect because ethene causes fruit ripening*	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
10(b)	An answer including **three** from: • fields with the weed killer had a higher crop yield (1) • the difference in crop yield varies (1) • this must be caused by some other external factor / named factor (1) • the weed killer caused the weeds to **overgrow** and die (1) • reducing **competition** for resources so more wheat could grow (1)	accept figures quoted from the table accept disrupts plant growth pattern accept reduced competition for named resources accept reverse argument	**(3)** **AO3 2ab**

Question number	Indicative content	Mark
10*(c)	**AO1 and AO2** **shoot growth** • auxins • moved to the shaded part of the plant shoot • causing cells to elongate • making the plant bend towards the light • this is an example of positive phototropism **root growth** • auxins • collect in large amounts on the underside of the root • inhibiting cell elongation • causing the cells above to elongate faster • causing the root to grow downwards • in the direction of gravity • this is an example of positive gravitropism	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections are made between elements in the context of the question
Level 2	3–4	Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections are made between elements in the context of the question
Level 3	5–6	Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and developed. The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question.

Level	Mark	
	0	No rewardable material.
Level 1	1–2	A simple statement of the direction of growth of shoots **OR** roots. Linked to some understanding of how or why this occurs.
Level 2	3–4	An explanation of either root **OR** shoot growth including reference to tropisms or cell elongation **OR** a simple explanation of both root **AND** shoot growth including reference to tropisms or cell elongation. Linked to the role of auxins.
Level 3	5–6	An explanation of root **AND** shoot growth including the process of cell elongation and direction of growth. Linked to the role of auxins in tropic responses.

(Total for question 10 = 11 marks)

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