Pearson Edexcel

Mark Scheme (Results)

Summer 2023

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

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General Marking Guidance

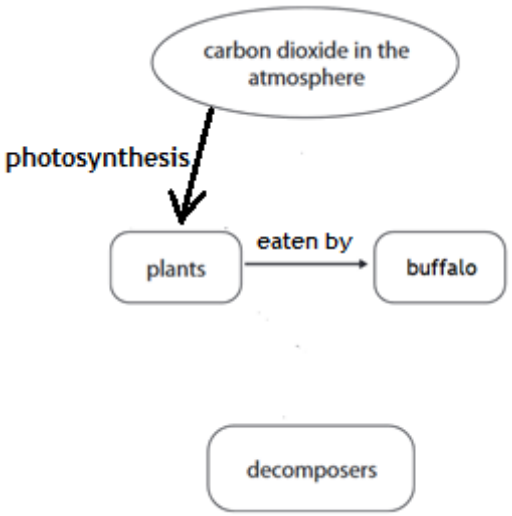
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should ma
- rk 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)	**The only correct answer is** **B mutualism** A is incorrect because eutrophication is not about feeding relationships. C is incorrect because indigenous is not a feeding relationship D is incorrect because biodiverse is not a feeding relationship	**(1)**

Question number	Answer	Mark
1(a)(ii)	• glucose (1) • decompose (1) answers must be in the correct order	**(2)**

Question number	Answer	Additional guidance	Mark
1(a)(iii)	• an arrow drawn from 'carbon dioxide in the atmosphere' to 'plants' (1) • arrow labelled photosynthesis (1)  	photosynthesis label mark can be awarded if arrow is drawn in the wrong direction.	(2)

Question number	Answer	Additional guidance	Mark
1(b)	An explanation linking: • (the enzyme is) denatured (1) • the active site will change shape (1) • so the protein / substrate will not fit into the active site (1)	 accept enzyme changes shape ignore references to the protein changing shape	(2)

Total marks for question 1 = 7 marks

Question number	Answer	Mark
2(a)	**The only correct answer is** **A burning fossil fuels** B is incorrect because insulating houses will not increase global warming C is incorrect because more solar panels will not increase global warming D is incorrect because nuclear power will not increase global warming	(1)

Question number	Answer	Additional guidance	Mark
2(b)(i)	Two conclusions from: • there was less rain in 2022 than average (1) • seven of the eight months (in 2022) had less rainfall than the average / {February was the **only** month / there was **only** one month} when more rain fell (than average in 2022) (1) • a specific comparison shown in the graph, e.g. {July had the largest difference / March had the least difference} in rainfall (1)	accept 2022 was a very dry year	(2)

Question number	Answer	Additional guidance	Mark
2(b)(ii)	(¼ of 44 or 44 ÷ 4) = 11 (1) 44 – 11 = 33 (tonnes)	award full marks for the correct answer with no working	**(2)**

Question number	Answer	Mark
2(b)(iii)	An explanation linking: • food security will be reduced (1) with two from: • as there will be less food (1) • food prices will increase (1) • so poor people can't obtain / afford as much food / people will be malnourished / starving (1) • people may not get enough nutrients / enough of a named nutrient (1)	**(3)**

Total marks for question 2 = 8 marks

Question number	Answer	Mark
3(a)(i)	aorta	(1)

Question number	Answer	Mark
3(a)(ii)	**The only correct answer is** **A thick high** B is incorrect because blood pressure is not low C is incorrect because width of wall is not thin D is incorrect because width of wall is not thin and blood pressure is not low	(1)

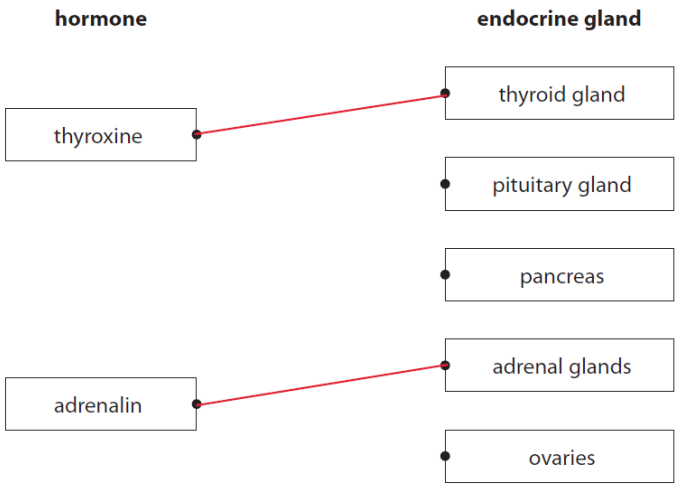
Question number	Answer	Additional guidance	Mark
3(b)	readings from graph 17 and 1 (1) evaluation (17 – 1 =) 16 (kPa)	award full marks for correct answer no working award 1 mark for (14 - 1) = 13	(2)

Question number	Answer	Mark
3(c)(i)	valve(s)	(1)

Question number	Answer	Mark
3(c)(ii)	to prevent backflow (of blood) / to keep blood flowing {towards the heart / in one direction} (1)	(1)

Question number	Answer	Mark
3(d)	A description including three from: • the muscular walls / muscles (1) • of the right ventricle / right hand side of the heart (1) • contract (1) • putting pressure on the blood / {pumping / pushing} blood (out of the heart) (1) • into the pulmonary artery (to the lungs) (1)	(3)

Total marks for question 3 = 9 marks

Question number	Answer	Mark
4(a)	 Do not award mark if more than one line is drawn from the thyroxine box. Do not award mark if more than one line is drawn from the adrenalin box.	(2)

Question number	Answer	Mark
4(b)(i)	follicle ruptures / ovulation / {egg / ovum} is released	(1)

Question number	Answer		Mark
4(b)(ii)	A description including two from: • progesterone levels increase (1) • uterus (lining) thickens / is maintained (1) • number of blood vessels (in uterus (lining)) increase / blood vessels increase in size (1)	accept prepares uterus (lining) for an ovum (to implant) (1)	(2)

Question number	Answer	Additional guidance	Mark
4(c)	An answer including one advantage and one disadvantage **advantages:** gives protection from STIs / non-prescription / easy to use / does not affect (the users) fertility / high success rate (if used properly) (1) **disadvantages:** can split / not as effective if past use by date / allergic to latex / reduced sensitivity (1)		(2)

Question number	Answer	Additional guidance	Mark
4(d)	An explanation including: • the pill contains oestrogen and / or progesterone (1) • (which) prevents ovulation / thickens mucus (1) • (so) sperm can't {reach / join / fertilise} the ovum	accept egg for ovum throughout	**(2)**

Total for question 4 = 9 marks

Question number	Answer	Additional guidance	Mark
5(a)(i)	evaluation (1.3 x 5.6 =) 7.28 (1) to 1 decimal place = 7.3	award full marks for correct answer no working	**(2)**

Question number	Answer	Mark
5(a) (ii)	**The only correct answer is** B — blood cells: X; urea: ✓; water: ✓ A is incorrect because the filtrate does not contain blood cells C is incorrect because the filtrate does not contain blood cells D is incorrect because the filtrate does contain urea	**(1)**

Question number	Answer	Mark
5(b) (i)	A description including four from: • add (nephron) liquids to different test tubes • add Benedict's (solution to the nephron liquids in test tubes) (1) • boil / heat (the mixture) (1) • if colour changes (from blue) to {green/yellow / orange / (brick) red} then glucose is present (1) • colour change is linked to concentrations of glucose / time taken for a colour change to occur (1) • control of one variable, e.g. use the same volume of {liquid / Benedict's solution} / put tubes in a {water bath / water in a beaker} / heat for same length of time / at the same temperature (1)	**(4)**

Question number	Answer	Mark
5(b) (ii)	An explanation including: • there is no glucose by the end of the first coiled tubule / in the urine (1) • because (all) the glucose has been reabsorbed (into the blood) (1) OR • all the glucose is reabsorbed (1) • because glucose is a useful molecule to the body (1) OR • there is the same concentration in the Bowman's capsule (and at the start of the first coiled tubule) • because no glucose is reabsorbed in the Bowman's capsule / the Bowman's capsule wall is impermeable to glucose (1)	**(2)**

Total for question 5 = 9 marks

Question number	Answer	Mark
6(a)	**The only correct answer is** **C indigenous trees will support more native wildlife** A is incorrect because indigenous trees will bring in less pests than non-indigenous trees. B is incorrect because indigenous trees are more likely to survive than non-indigenous trees D is incorrect because indigenous trees damage soils less than non-indigenous trees.	**(1)**

Question number	Answer	Additional guidance	Mark
6(b)(i)	a straight line drawn on the graph showing the main trend with roughly equal plots on both sides (ignoring the anomalous point)	accept minimum of 4 crosses above / below their line that shows the general trend.	**(1)**

Question number	Answer	Mark
6(b)(ii)	the biodiversity at 2022 should be taken from their line of best fit drawn on the graph	**(1)**

Question number	Answer	Additional guidance	Mark
6(c)(i)	Any two from: • sample other areas of the forest (1) • use more (than 3) quadrats / use larger quadrats (1) • calculate an average / mean (1) • sample animals on the leaves / branches / trunks / trees / in soil (1)	accept increase area sampled (to more than $100m^2$) accept repeat the investigation on different dates (1)	**(2)**

Question number	Answer	Additional guidance	Mark
6(c)(ii)	because the data was anomalous / an outlier / doesn't fit in with the trend	accept it was much lower than the other points	**(1)**

Question number	Answer	Additional guidance	Mark
6(c)(iii)	An explanation to include two from: • the biodiversity will be lower (1) • because there will be less {food / shelter} / fewer leaves / the animals will be hibernating / the animals will have migrated (1)	accept it is colder / wetter	**(2)**

Question number	Answer	Additional guidance	Mark
6(d)	A description including three from: • place a line (at 90°) from edge of forest (1) • place a quadrat against the line (1) • {count / record} the {number of / height} of {species / plants} (in the quadrat) (1) • measure the light (intensity) (1) • move along the line / repeat at different distances (from the forest) (1)	accept types for species accept sample a shaded area and a sunny area	**(3)**

Total for question 6 = 11 marks

Question number	Answer	Mark
7(a)(i)	**The only correct answer is** B | 12 | 10 A is incorrect because there has to be a difference in concentration to allow net diffusion to take place C is incorrect because this would lead to diffusion of oxygen into species A D is incorrect because there has to be a difference in concentration to allow net diffusion to take place	**(1)**

Question number	Answer	Additional guidance	Mark
7(a)(ii)	Substitution 9000 ÷ 6000 (1) Evaluation = 3 : 2 / 1.5 : 1	Award full marks for correct answer no working	**(2)**

Question number	Answer	Additional guidance	Mark
7(a)(iii)	An explanation linking two of the following: • cell A {has a larger surface area (to volume ratio) / has a bigger surface area (for each unit volume)} (1) • so {more oxygen will diffuse / oxygen will diffuse faster} (out of cell A) (1)		**(2)**

Question number	Answer	Additional guidance	Mark
7(b)	the algae will get (more) light / heat (for photosynthesis)		**(1)**

Question number	Indicative content	Mark
7(c)*	• leaves are arranged on the plant so they do not overlap each other (too much). • so that all / more leaves are in (direct) light / to absorb more light • as light is needed for / supplies the energy used in photosynthesis • leaves are green / have (large amounts of) chloroplasts / chlorophyll • to absorb (more) light • as light is needed for / supplies the energy used in photosynthesis • chlorophyll is mainly in the {palisade cells / upper part of leaf} • to absorb (more) light / as the sun shines on the top of leaves • as light is needed for / supplies the energy used in photosynthesis • the leaves are flat / have a large surface / have a large area • to absorb more light • as light is needed for / supplies the energy used in photosynthesis • leaves have ribs / veins • to strengthen them / to hold them up so they absorb more light / are facing the sun • as light is needed for / supplies the energy used in photosynthesis • leaves are thin • so that carbon dioxide diffuses / gets to chloroplasts / chlorophyll (quickly) • as carbon dioxide is a reactant of / needed for photosynthesis • leaves have many stomata • to absorb carbon dioxide • as carbon dioxide is a reactant of / needed for photosynthesis • leaves have / are connected to xylem (vessels) • which supply the leaves with water • as water is a reactant of / needed for photosynthesis	**(6)** exp

Level	Mark	Descriptor
	0	• No awardable content
Level 1	1-2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear. (AO2)
Level 2	3-4	• The explanation is mostly supported through 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 mostly supported through the application of relevant evidence. (AO2)
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 evidence. (AO2)

Level	Mark	Additional guidance	General additional guidance The level is driven by the adaptations. The mark within the level is determined by linkage to explanations.
	0	No rewardable material.	
Level 1	1–2	• makes a simple reference about an adaptation of leaves • the adaptation is linked to an explanation / photosynthesis	• leaves are green • leaves are green because they have chlorophyll / leaves are green to absorb light
Level 2	3–4	• adaptations are identified • an adaptation is linked to an explanation / photosynthesis	• leaves are green and flat • leaves are green and flat to absorb more light / to increase the rate of photosynthesis
Level 3	5–6	• more than two adaptations are identified • more than one adaptation is linked to an explanation with one linked to photosynthesis	• leaves have chloroplasts, are flat and have stomata • as above + chloroplasts absorb light which is needed for photosynthesis and carbon dioxide enters the leaf through the stomata

Total for question 7 = 12 marks

Question number	Answer	Additional guidance	Mark
8(a) (i)	A description including two from: The blood glucose concentration for the person with diabetes (compared with the person who does not have diabetes) is • always higher (1) • reduces at a slower rate (1) • does not return to pre meal levels (in the six-hour period) (1) • does not get lower than pre meal levels (1)	accept reverse description accept other valid comparisons (1) accept concentrations (without units) from graph	**(2)**

Question number	Answer	Mark
8(a) (ii)	9 (mmol per dm^3)	**(1)**

Question number	Answer	Additional guidance	Mark
8(a)(iii)	An explanation including: • (water moves out) by osmosis (1) • because the concentration of glucose is higher in the blood (plasma) (1) • across a partially permeable membrane (1)	accept from a high water potential inside the cell to a low water potential outside the cell	(2)

Question number	Answer	Mark
8(b)(i)	insulin	**(1)**

Question number	Answer	Additional guidance	Mark
8(b)(ii)	in the blood / plasma	accept dissolved / in solution	**(1)**

Question number	Answer	Mark
8(b)(iii)	**The only correct answer is** **C liver** A is incorrect because the target organ is not the kidney B is incorrect because the pancreas produces insulin D is incorrect because the target organ is not the lungs	**(1)**

Question number	Answer	Additional guidance	Mark
8(c)	An explanation including three from: • exercise (1) • control diet / lose weight (1) • to {reduce / control} **blood glucose** (1)	accept avoid {sugar/carbohydrate} in your diet accept methods of testing blood for signs of diabetes (1) accept take {medication / metformin / insulin} (1)	**(3)**

Total for question 8 = 11 marks

Question number	Answer	Mark
9(a)	**The only correct answer is** **D to release energy** A is incorrect because nitrogen is not involved in respiration. B is incorrect because oxygen is used during respiration, not released C is incorrect because glucose is used during respiration, not produced	**(1)**

Question number	Answer	Additional guidance	Mark
9(b)(i)	An explanation linking two from: • to absorb **more** oxygen (into the blood / body) (1) • so that **more** respiration can occur / more energy is released (1) OR • to remove **more** carbon dioxide (from the blood / body) (1) • from **more** respiration / because carbon dioxide makes the blood more acidic (1)	accept to absorb oxygen (into the blood) more quickly accept so that respiration can occur more quickly / energy is released more quickly	**(2)**

Question number	Answer	Additional guidance	Mark
9(b)(ii)	An answer including two from: • aerobic respiration uses oxygen / anaerobic does not use oxygen (1) • aerobic respiration releases more energy /anaerobic releases less energy (1) • aerobic produces {carbon dioxide / water} / anaerobic respiration produces lactic acid (1)	accept ATP for energy accept lactate for lactic acid accept aerobic respiration takes place in the mitochondria / anaerobic respiration takes place in the cytoplasm (1) ignore references to types of exercise / when the types of respiration occur	**(2)**

Question number	Answer	Additional guidance	Mark
9(c)(i)	An explanation linking: • you breathe out (air with a high concentration of) carbon dioxide (1) • which forms a (weak) acid (when it dissolves) (1)	 accept it contains carbon dioxide accept lowers the pH	**(2)**

Question number	Indicative content	Mark
9(c)(ii)*	Plan: Running • athletes run at different speeds • method to vary speed, e.g. distance covered in a fixed time / use of treadmill BTB • breathe (out) through green BTB (at the end of each run and note the colour / time how long BTB takes to get to a set colour) • relate the results (colour of BTB / time it takes to get to a set colour) to the pH or to how much carbon dioxide is being breathed out Controlled variables include • same age range, same sex balance, same lifestyle (of different athletes) • length of time / distance run for each 'running speed' • use of a treadmill to standardise speed • volume / concentration of green BTB • ensure colour of green BTB is the same at the start • standardised recovery times between running speeds (if the same athletes are running at each different speed) Control: • include the colour change of green BTB at rest	**(6)**

Level	Mark	Descriptor
	0	No awardable content
Level 1	1–2	• The plan attempts to link and apply knowledge and understanding of scientific enquiry, techniques and procedures, flawed or simplistic connections made between elements in the context of the question. (AO2) • Analyses the scientific information but understanding and connections are flawed. An incomplete plan that provides limited synthesis of understanding. (AO3)
Level 2	3–4	• The plan is mostly supported through linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, some logical connections made between elements in the context of the question. (AO2) • Analyses the scientific information and provides some logical connections between scientific enquiry, techniques and procedures. A partially completed plan that synthesises mostly relevant understanding, but not entirely coherently. (AO3)
Level 3	5–6	• The plan is supported throughout by linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, logical connections made between elements in the context of the question. (AO2) • Analyses the scientific information and provide logical connections between scientific concepts throughout. A well-developed plan that synthesises relevant understanding coherently. (AO3)

Level	Mark	Additional guidance	General additional guidance The level is driven by the workability of the plan. The mark within the level is determined by the control of variables.
	0	No rewardable material.	
Level 1	1–2	States a relevant part of a plan or states a variable to control	<u>Possible candidate responses</u> • Get athletes to run at different speeds • Get athletes to run the same distance at different speeds
Level 2	3–4	States parts of a plan including a reference to BTB Controls one variable or includes a control	<u>Possible candidate responses</u> • Get athletes to run at different speeds then breathe out through BTB • As above + use the same volume of BTB each time
Level 3	5–6	Produces a workable plan including the use of BTB to measure the pH or carbon dioxide concentration Controls variables or controls one variable and includes a control	<u>Possible candidate responses</u> • Get athletes to run at different speeds. The athletes then breathe into BTB and relate the colour change to pH / CO_2 concentration. • As above + the athletes need to be the same age and run the same distance

Total for question 9 = 13 marks

Question number	Answer	Mark
10(a)(i)	The only correct answer is **C hypothalamus** A is incorrect because the kidney does not control body temperature B is incorrect because the pituitary gland does not control body temperature D is incorrect because the pancreas does not control body temperature	**(1)**

Question number	Answer	Mark
10(a)(ii)	Any one from • volume of water in each beaker (1) • {size / shape} of container (1) • mass / weight / thickness of material (1) • **starting** temperature (1)	**(1)**

Question number	Answer	Additional guidance	Mark
10(a)(iii)	A description including the following • repeat the experiment / set the apparatus up as shown in Figure 8 (1) • without the insulating material (1)	 accept set up a beaker and a thermometer	**(2)**

Question number	Answer	Mark
10(b)(i)	An answer which compares and contrasts the two materials including the following • with both materials the temperature drops over time (1) • the drop in temperature for polyester was faster / greater than wool (1)	**(2)**

Question number	Answer	Mark
10(b)(ii)	Any one from • begin with the same starting temperature (1) • continue the investigation until the temperature stops dropping (1)	**(1)**

Question number	Answer	Mark
10(c)(i)	An explanation linking the following • sweat is released onto (the surface of) the skin (1) • which evaporates (1) • that cools the body / removes heat (1)	**(2)**

Question number	Answer	Additional guidance	Mark
10(c)(ii)	A statement including the following: • (urea) is produced in the liver (1) • from excess amino acids / protein (1)	accept by (the process of) deamination	**(2)**

Total for question 10 = 11 marks