Pearson Edexcel

Mark Scheme (Results)

Summer 2024

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

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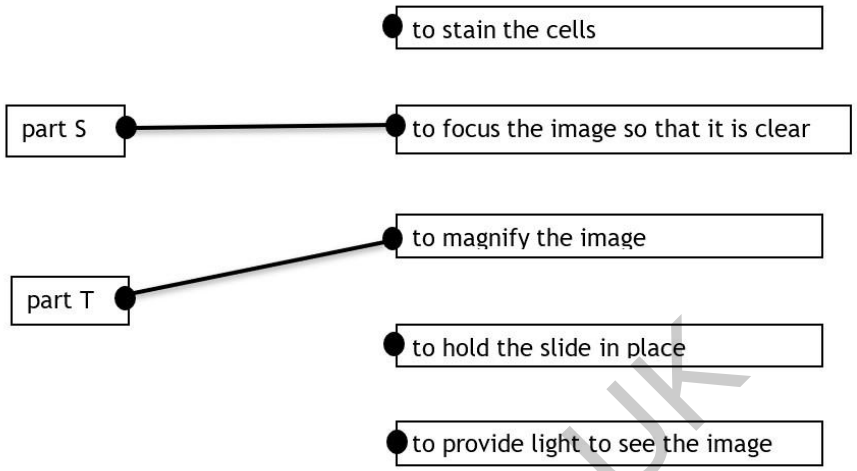
General Marking Guidance

- 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 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)	Part of microscope Function  Do not award mark if two lines are drawn from part S box Do not award mark if two lines are drawn from part T box	**(2)**

Question Number	Answer	Additional guidance	Mark
1(b) (i)	A biological diagram that shows: • the shape of the bacterial cell (1) • two flagella (1) • one structure labelled from: flagellum / cytoplasm / cell wall (1)	accept 3, 4 or 5 flagella (shown faintly on figure 2) accept membrane / ribosome accept tail / flagella for flagellum	**(3)**

Question Number	Answer	Additional guidance	Mark
1(b)ii	An answer including: a light microscope • is affordable / easy to use / large field of view / portable (1) an electron microscope • gives higher resolution / shows (more) detail (1)	 accept it shows colour / living cells accept can magnify image more / can show {more/smaller} structures of the cell ignore clearer image	**(2)**

Total for question 1 = 7 marks

Question Number	Answer	Mark
2(a)	D carbon dioxide oxygen **The only correct answer is D** A is incorrect because light is not a product of photosynthesis B is incorrect because light is not a reactant for photosynthesis C in incorrect because oxygen is not a reactant and carbon dioxide is not a product of photosynthesis	**(1)**

Question Number	Answer	Mark
2(b)	chlorophyll accept phonetic spellings of chlorophyll	**(1)**

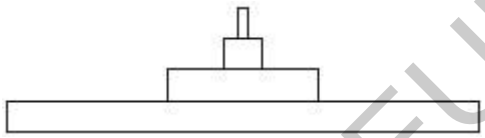
Question Number	Answer	Additional guidance	Mark
2(c)(i)	A plan including three from: • place the plants in different light levels / shine light on one plant / keep one in light and the other in the dark (1) • leave for a period of time (1) • water the plants (1) • measure the {height / mass} / count the number of leaves (1)	accept (use metre rule to) place a lamp at different distances from the plants if a time period is stated it should be for at least 1 day accept measure / see how much they have grown	**(3)**

Question Number	Answer	Additional guidance	Mark
2(c)ii	volume of water / temperature / size of plants / time period / type of soil	ignore amount for volume accept use the same type / species of plant	**(1)**

Question Number	Answer	Additional guidance	Mark
2(c)iii	An explanation including: • photosynthesis would stop (1) • because enzymes would be denatured / destroyed (1)	 accept reduce accept enzymes wouldn't work / plants die / plants would dry out reject enzymes are killed ignore plants / plant cells denaturing	**(2)**

Total for question 2 = 8 marks

Question Number	Answer	Additional guidance	Mark
3 (a)	Transfer of energy / energy flow / is eaten by		**(1)**

Question Number	Answer	Mark
3 (b)	 D **The only correct answer is D** A is incorrect because only two trophic levels are shown B is incorrect because the biomass should decrease in size as the food chain progresses C is incorrect because the biomass should decrease in size as the food chain progresses	**(1)**

Question Number	Answer	Additional guidance	Mark
3 (c)	6 ÷ 100 x 15 / 6 x 15% (1) = 0.9 (g)	Accept correct answer on answer line for 2 marks ecf 15% of any number correctly calculated (1)	**(2)**

Question number	Answer	Additional guidance	mark
3 (d)(i)	An answer including two from: • (burning / using) fossil fuels / oil / gas / wood (1) • cutting down {trees / hedges} / deforestation (1) • farming animals / cows (for meat) (1) • (organic) waste materials being added to landfill (1)	accept driving cars / planes accept other named fuels accept building houses on fields accept paddy fields / growing rice	(2)

Question Number	Answer	Additional guidance	Mark
3 (d) ii	An explanation including: • the number (of aphids) will decrease (1) • because the moths eat the aphid's food (1)	accept because there is less food for the aphids / the moths outcompete the aphids	**(2)**

Total for question 3 = 8 marks

Question Number	Answer	Additional guidance	Mark
4(a)	**two** crosses to show the position of the ovaries in the regions shown. 	accept dots, letters, shading for crosses accept label lines to correct areas do not award if three crosses are drawn on the diagram	**(1)**

Question Number	Answer	Additional guidance	Mark
4(b)	repairs / thickens / increases blood supply / maintains (uterus lining)	ignore it expands / strengthens	**(1)**

Question Number	Answer	Mark
4(c) (i)	B pancreas **The only correct answer is B** A is incorrect because the thyroid gland does not make insulin C is incorrect because the adrenal glands do not make insulin D is incorrect because the pituitary gland does not make insulin	**(1)**

Question Number	Answer	Additional guidance	Mark
4 (c) (ii)	in the blood / plasma	accept in the blood system / in blood vessels / in arteries / in veins ignore capillaries	**(1)**

Question Number	Answer	Additional guidance	Mark
4 (c) (iii)	liver	accept muscles	**(1)**

Question Number	Answer	Additional guidance	Mark
4(d) (i)	A description including: the concentration of glucose in the blood • decreases (1) • then decreases at a faster rate (between 12.30pm and 1pm) (1)	 accept negative correlation	**(2)**

Question Number	Answer	Additional guidance	Mark
4 (d) (ii)	eaten a meal / eaten food	 accept drink a named source of sugar e.g. fruit juice accept injected with glucagon	**(1)**

Question Number	Answer	Additional guidance	Mark
4 (e)	An answer including two from: • reduce {carbohydrate / sugar / glucose} in their diet (1) • exercise (1) • lose weight (1)	 accept control their diet ignore healthy diet / balanced diet / go on a diet accept inject insulin / take medication /	**(2)**

		take named medication (1) award one mark for control their lifestyle if no other mark is awarded	

Total for question 4 = 10 marks

Question Number	Answer	Mark
5 (a) (i)	B layer F **The only correct answer is B** A is incorrect because 'layer E' has no chloroplasts C is incorrect because the cells in layer G have fewer chloroplasts than the cells in layer F D is incorrect because cells in layer H have fewer chloroplasts than the cells in layer F	**(1)**

Question Number	Answer	Mark
5 (a) (ii)	starch accept phonetic spellings of starch	**(1)**

Question Number	Answer	Mark
5 (a) (iii)	(the guard cells) {open / close / change the size of} the stomata	**(1)**

Question Number	Answer	Additional guidance	Mark
5 (b) (i)	substitution 7.2+7.1+6.9+5.4+5.9+6.1 = 38.6 (1) evaluation (38.6) ÷ 6 = 6.43$\dot{}$ to 1 decimal place = 6.4	accept correct answer on answer line for 3 marks accept their total correctly divided by 6 for 1 mark 6.43$\dot{}$ / 6.43 on the answer line for 2 marks ecf for a calculated number correctly rounded to 1 decimal place for 1 mark	**(3)**

Question Number	Answer	Additional guidance	Mark
5 (b) (ii)	An explanation including two from: • the cuticle is thinner (1) • as the plant has plenty of water / doesn't need to conserve {so much water / as much water as plant growing in dry soil} (1) • as the cuticle is waterproof (1)		**(2)**

Question Number	Answer	Mark
5 (b) (iii)	has {smaller leaves / curled leaves / spines / fewer stomata / smaller stomata / fleshy leaves / smaller surface area (to volume ratio) / store water}.	**(1)**

Total for question 5 = 9 marks

Question Number	Answer	Mark
6(a)	A diffusion **The only correct answer is A** B is incorrect because osmosis only relates to water molecules C is incorrect because the movement of carbon dioxide from the blood into the alveolus does not involve using ATP D is incorrect because transpiration is the evaporation of water from leaf cells.	**(1)**

Question Number	Answer	Additional guidance	Mark
6(b)	Any one from • walls that are {thin / flattened / one cell thick} (1) • a large surface area (1) • a good blood supply / many capillaries (1)	reject cell walls ignore references to high / low concentrations of oxygen / carbon dioxide	**(1)**

Question Number	Answer	Additional guidance	Mark
6(c)	A description including two from: • heart muscle contracts / heart pumps blood (1) • (putting blood) under pressure (1) • through the pulmonary artery (1)	accept right ventricle for heart muscle accept through an artery reject aorta	**(2)**

Question Number	Answer	Mark
6(d) (i)	A description including: • the heart rate increases then decreases (1) • credit any correct reference to data e.g. it goes up {to 200 bpm / until 25 minutes} (1)	**(2)**

Question Number	Answer	Additional guidance	Mark
6(d) (ii)	An explanation including two from: • the person is exercising / using their muscles **more** (1) • so need **more** oxygen / glucose (1) • for **more** respiration (1)	accept remove more carbon dioxide **more** only has to be written once for more oxygen / more glucose / more respiration	**(2)**

Question Number	Answer	Additional guidance	Mark
6(d) (iii)	200 (reading from graph) (1) 0.13 x 200 (1) 26 (dm^3 per minute)	accept correct answer on answer line for 3 marks	**(3)**

Total for question 6 = 11 marks

Question Number	Answer	Mark
7(a)	C Filtration. **The only correct answer is C** A is incorrect because diffusion is due to the random movement of particles B is incorrect because osmosis only refers to water molecules. D is not correct because absorption relates to being taking in rather than being forced out.	**(1)**

Question Number	Answer	Additional guidance	Mark
7(b)	An explanation including: • red blood cells are too large (1) • to pass out of the blood capillaries (1)	accept to pass through the small **holes** in the glomerulus accept the red blood cells are too big to be filtered for 2 marks	**(2)**

Question Number	Answer	Additional guidance	Mark
7(c)i	A description including: • water (from the urine) (1) • is (re)absorbed / moved back into the blood / body (1)	accept by osmosis / from high to low concentration (of water) (1) accept osmoregulation for 2 marks	**(2)**

Question Number	Answer	Additional guidance	Mark
7(c)ii	the bladder accept phonetic spellings of bladder		**(1)**

Question number	Indicative content	Mark
7 *(d)	**Preparation** • add food to a boiling tube / spotting tile • reference to size of food sample • reference to other equipment used e.g. water bath **Glucose / reducing sugar** • add Benedict's solution • reference to volume of reagent used • heat / boil • look for the colour change • blue to green / orange / yellow / (brick) red • to indicate glucose is present **Protein** • add Biuret solution • reference to volume of reagent used • do not heat / no mention of heat • wait / reaction takes a little time • look for the colour change • blue to purple / pink • to indicate protein is present	**(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, enquiry, techniques and procedures lacks detail. (AO1) • Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3-4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) • Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) • Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Additional guidance	General additional guidance The level is driven by the workability of the plan for the food tests for glucose and protein. The mark within the level is determined by the completeness of the plan
	0	No rewardable material.	
Level 1	1–2	States a relevant part of a test for glucose OR protein Presents a description for one of the tests with significant gaps	Possible candidate responses • add Benedict's (solution) to the food • add Benedict's solution to the food and see what colour it goes.
Level 2	3–4	Produces a workable plan for the tests for glucose OR protein Presents a description of one of the tests with reference to a colour change	Possible candidate responses • add some Benedict's solution to some food and heat it. • add some Benedict's solution to the food and heat it, and look for a colour change
Level 3	5–6	Produces a workable plan for the tests for both glucose AND protein Presents a description of both tests including a correct colour change and links this to glucose OR protein	Possible candidate responses • add Benedict's solution to the food and heat it. For protein, add Biuret solution / reagent to the food. • add Benedict's solution to the food and heat it. See if it goes orange / red and this will mean it contains glucose. For protein, add Biuret solution / reagent and see what colour it goes

Total for question 7 = 12 marks

Question Number	Answer	Additional guidance	Mark
8(a)	An explanation linking: • (the left ventricle) is **more** muscular / provides **more** pressure (1) • because the (left ventricle) pumps blood {around more of the body / through more organs / through more blood vessels} (1)	 ignore to withstand higher pressure accept pushes blood for pumps blood accept the blood is pumped further/around the body (other than the lungs)	**(2)**

Question Number	Answer	Mark
8(b)(i)	plasma (accept phonetic spellings)	**(1)**

Question Number	Answer	Mark
8(b)(ii)	The only correct answer is **D oxygen** A is incorrect because carbon dioxide is not needed for respiration B is incorrect because urea is not carried by red blood cells or needed for respiration C is not correct because amino acids are not needed for respiration	**(1)**

Question Number	Answer	Additional guidance	Mark
8(b)(iii)	• phagocytes (1) • lymphocytes /B cells / memory cells (1)	answers can be in either order accept T cells accept other correctly named white blood cells (1)	**(2)**

Question Number	Answer	Additional guidance	Mark
8(c)(i)	470 ÷ 100 **or** 4.7 (1) 4.7 x 44 = 206.8 (1) 207 **OR** 44 ÷ 100 **or** 0.44 (1) 0.44 x 470 = 206.8 (1) 207 **OR** 44 x 470 **or** 20680 (1) 20680 ÷ 100 = 206.8 (1) 207	accept correct answer on answer line for 3 marks award two marks for 206.8 / 206 ecf for a calculated number in the working to the nearest whole number accept alternative methods of calculating percentages award two marks for 263 award one mark for 263.2	**(3)**

Question Number	Answer	Additional guidance	Mark
8(c)(ii)	Any two from: • wear gloves / wash hands (1) • sterilise skin (of donor) (1) • sterilise needle/use sterile needle (1) • cover the wound after taking blood (1)	accept wear mask accept use hand gel accept doctor covers any open wounds/cuts accept clean the skin accept sterilise equipment	**(2)**

Total for question 8 = 11 marks

Question Number	Answer	Mark
9(a)(i)	vacuole / large vacuole / permanent vacuole accept phonetic spellings	**(1)**

Question Number	Answer	Mark
9(a)(ii)	Any one from: • it has a large surface area / it is long / large surface area : volume (1) • thin (cell) wall (1) • many mitochondria (1)	**(1)**

Question Number	Answer	Additional guidance	Mark
9(a)(iii)	An explanation linking: • (root hair cells grow) underground (1) • where there is no sunlight / light (1) • so they can't photosynthesise (1)	 accept roots grow underground / in the soil accept roots can't photosynthesise / chloroplasts are needed for photosynthesis	**(3)**

Question Number	Answer	Additional guidance	Mark
9(b)	A description including two of the following: • in tap water **chloroplasts** are near the {cell wall / cell membrane / edge of the cell} (1) • in salt water **chloroplasts** are in the middle of the cells / **chloroplasts** clump together (1)	accept reverse argument about cells not in salt solution accept cells appear larger / cells are more magnified (in salt water) (1)	**(2)**

Question number	Indicative content	Mark
9 *(c)	**AO1 6 marks** **Roots** • water enters the roots • into root hair cells • which have a projection / large surface area • by osmosis • from a dilute solution in the soil to a more concentrated solution in the root cells. **Stem/trunk** • through xylem • which are long / thin / hollow / lignified / dead cells • because water is being pulled up • because of transpiration **Leaves** water moves into the leaves • by osmosis • because the leaf cell contents are more concentrated than in the xylem • water evaporates / water moves out of the leaves • through the stomata • (into the air) by diffusion • reference to transpiration	**(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. • presents an explanation with some structure and coherence.
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. • presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	5-6	• demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • presents an explanation that has a well-developed structure which is clear, coherent and logical.

Level	Mark	Additional guidance	General additional guidance The level is driven by the areas covered in the response. The mark within the level is determined by the detail.
	0	No rewardable material.	
Level 1	1–2	The answer refers to part of the route taken by water through the plant / tree The response includes a basic explanation of how water moves through the plant	Possible candidate responses • water leaves the plant through the leaves • water leaves the plant via evaporation from the leaves
Level 2	3–4	The answer refers to more than one part of the route taken by water through the plant / tree The response includes an explanation of how water is moved into the roots, through the plant or through the leaves	Possible candidate responses • water moves into the root and up the stem • water moves into the root via osmosis and up the stem
Level 3	5–6	The answer is detailed and refers to water moving into the roots, through the stem / branches and out of the leaves The response includes a detailed explanation of how water is moved into the roots, through the plant or out of the leaves	Possible candidate responses • water moves into the root. Water then moves up the stem in the xylem out of the leaves. • water moves into the root. Water then moves up the stem in the xylem to the leaves where it is lost to the air via transpiration

Total for question 9 = 13 marks

Question number	Answer	Additional guidance	Mark
10(a)	Any two from: • temperature (1) • humidity / water levels (1) • {size / volume / size of holes / material} of bag (1)	accept the bags need to be identical	**(2)**

Question number	Answer	Additional guidance	Mark
10(b)(i)	correct data selected and subtracted 200 – 120 = 80 (1) Rate calculated 80 ÷ 50 = 1.6 (g per day)	accept correct answer on the answer line for 2 marks ecf accept 2.6 for 1 mark (oak)	**(2)**

Question number	Answer	Additional guidance	Mark
10(b)(ii)	An answer including: • both holly and oak leaves decrease in mass (1) • oak leaves decrease in mass faster (1)	ORA	**(2)**

Question number	Answer	Additional guidance	Mark
10(c)	An explanation linking: • decomposition of leaves release minerals /named minerals (1) • which are absorbed / used by other organisms / plants / primary producers (1) **OR** • (if they weren't decomposed) leaves would build up covering small plants • small plants wouldn't {get light / be able to photosynthesise} (1)	accept nutrients for minerals accept recycling of minerals / nutrients for 2 marks accept small plants would die accept supplies energy to decomposers / named decomposers (1)	**(2)**

Question number	Answer	Additional guidance	Mark
10(d)	bacteria / fungi / detritivores	accept microorganisms / named {decomposers / detritivores}	(1)

Question number	Answer	Mark
10(e)	An explanation including two from: • the change in mass of snails is smaller than the change in mass of the leaves / {not all the mass / only 120 g} of the leaves is transferred to the snails (1) • some of the leaves were not {digested / absorbed} / some of the leaves were {excreted / egested} (1) • some mass was used up in {respiration / providing energy} for the snail (1) • some mass / energy was used up by the snail moving (1) • leaf mass may be digested by decomposers (1)	(2)

Total for question 10 = 11 marks