Pearson Edexcel

Mark Scheme (Results)

November 2020

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

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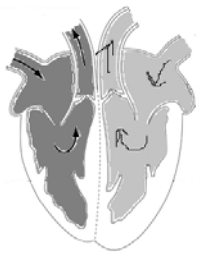
General Marking Guidance

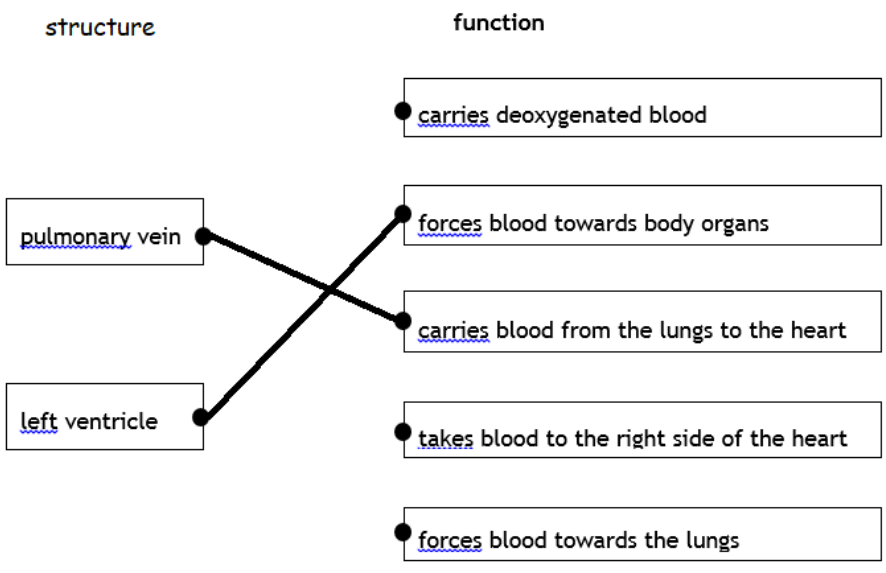
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should 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.

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	Additional guidance	Mark
1(a)(i)	All three arrows in correct direction (1) 	accept any number of arrows showing the correct route	(1)

Question number	Answer	Mark
1(a)(ii)	B valve T closes The only correct answer is **B** valve T closes A is incorrect because valve T does not open. C is incorrect because blood is not forced into the left atrium. D is incorrect because blood is not forced into the pulmonary vein.	(1)

Question number	Answer	Mark
1(a)(iii)		(2)

	Reject if more than one line is drawn from each structure.	

Question number	Answer	Mark
1(b)(i)	An explanation linking the following: • the valve closes (1) • (therefore) it prevents backflow (1)	**(2)**

Question number	Answer	Additional guidance	Mark
1(b)(ii)	To kill bacteria / pathogens / microorganisms /	accept to sterilise equipment ignore disinfect / clean equipment	**(1)**

Total for question 1 = 7 marks

Question number	Answer	Mark
2(a)(i)	food reject if more than one word is used from the box	(1)

Question number	Answer	Mark
2a(ii)	parasites reject if more than one word is used from the box	(1)

Question number	Answer	Mark
2(b)	C platelets The only correct answer is **C** platelets A is incorrect because red blood cells do not start the clotting process. B is incorrect because water does not start the clotting process. D is incorrect because white blood cells do not start the clotting process.	(1)

Question number	Answer	Additional guidance	Mark
2(c)(i)	mutualism / mutualist / mutualistic	accept mutual accept symbiotic / symbiosis /symbionts	(1)

Question number	Answer	Additional guidance	Mark
2(c)(ii)	• grass (in first box) (1) • zebra, tick, oxpecker (in correct order in boxes 2,3 and 4) (1)	Award one mark if grass, zebra, tick and oxpecker are in the correct order but written from right to left.	**(2)**

Question number	Answer	Additional guidance	Mark
2(d)(i)	A description including: • there are more oxpeckers on the (white) rhinos (than hippos) (1) • manipulated data (1)	Manipulated data could include: 7 - 2 = difference of 5 7 ÷ 2 = 3.5 times more oxpeckers (2 marks)	**(2)**

Question number	Answer	Additional guidance	Mark
2(d)(ii)	There are more ticks / food (on the giraffes than the zebras)	accept other reasons such as (giraffes are) larger / thinner skinned / more tolerant of oxpeckers	**(1)**

Total for question 2 = 9 marks

Question number	Answer	Additional Guidance	Mark
3(a)(i)	Label to any part or the edge of the vacuole	accept an answer / letter written inside vacuole	**(1)**

Question number	Answer	Mark
3(a)(ii)	An explanation linking: • has a long / thin / finger like projection (1) • which increases the (surface) area (1) OR • cell wall is thinner (1) • (so) the distance water travels is shorter (1)	**(2)**

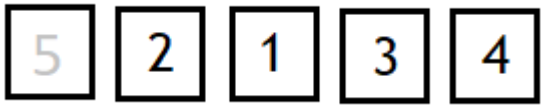
Question number	Answer	Additional guidance	Mark
3(b) (i)	• substitution 72 ÷ 5 (1) • evaluation = 14.4 (cm^2 per day)	accept 14 (cm^2 per day) Award full marks for correct answer with no working.	**(2)**

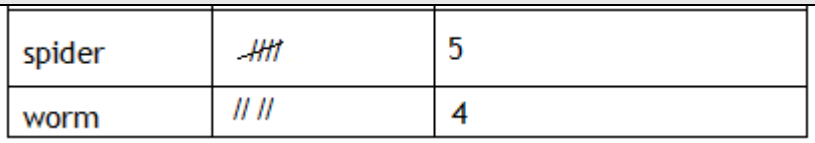
Question number	Answer	Additional guidance	Mark
3(b) (ii)	The growth / area of fungus increases	accept it goes up accept manipulated data e.g. the area is 9 times larger accept the higher the temp, the bigger (the area of) the fungus.	**(1)**

Question number	Answer	Additional guidance	Mark
3(c)(i)	An explanation linking two of the following: • enzymes are heat sensitive (1) • the shape of the enzyme / active site changes (1) • (enzymes) become **denatured** (1) • substrate(s) will not fit in the active site (1)	reject kill enzyme.	**(2)**

Question number	Answer	Mark
3(c)(ii)	Water moves out (of the fungus cells) / cells become dehydrated	**(1)**

Total for question 3 = 9 marks

Question number	Answer	Additional guidance	Mark
4(a)	 • Correct sequence (2)	award one mark if 2 is in the second box or 4 is in the last box.	(2)

Question number	Answer	Mark
4(b)(i)	 • Spider line correct (1) • Worm line correct (1)	(2)

Question number	Answer	Additional guidance	Mark
4(b)(ii)	Substitution 6 out of 30 / 6 in 30 / 6/30 (1) Simplest form 1 in 5 / 1/5 / 0.2 / 20%	accept there are 6 ants and there are 30 invertebrates. award full marks for correct answer with no working.	(2)

Question number	Answer	Mark
4(b)(iii)	One type of food may only attract some invertebrates / some foods may attract many different types of invertebrates.	(1)

Question number	Answer	Mark
4(c)	A description including: • Calculate a mean / average (1) • Multiply mean by 40 / the area (1) OR • Add together the number of snails in the 4 areas (1) • Multiply by 10 (1)	**(2)**

Total for question 4 = 9 marks

Question number	Answer	Mark
5(a)(i)	D pancreas insulin The only correct answer is **D** pancreas insulin A is incorrect because the ovary does not produce a hormone that controls blood glucose concentration. B is incorrect because the ovary does not produce a hormone that controls blood glucose concentration. C is incorrect because oestrogen does not control blood glucose concentration.	**(1)**

Question number	Answer	Mark
5(a)(ii)	Liver / muscles / named muscle	**(1)**

Question number	Answer	Additional guidance	Mark
5(b)(i)	Substitution $110 \div 2.0^2$ (1) Evaluation = 27.5	 accept 28 Award full marks for correct answer with no working.	**(2)**

Question number	Answer	Mark
5(b)(ii)	A description that includes **two** from: • lose weight (1) • control diet / eat less sugary food (1) • exercise **more** (1)	**(2)**

Question number	Answer	Mark
5(c)(i)	A aerobic respiration and anaerobic respiration. The only correct answer is **A** aerobic respiration and anaerobic respiration B is incorrect because anaerobic respiration uses glucose. C is incorrect because aerobic respiration uses glucose. D is incorrect because aerobic respiration and anaerobic respiration use glucose.	**(1)**

Question number	Answer	Mark
5(c)(ii)	An explanation linking **three** of: • as activity / speed increases, the respiration rate increases (1) • because respiration supplies energy (to muscles / cells) (1) • when sleeping you are not moving / using muscles very much (1) • the faster you run / the more you use muscles (1) • so more energy is required. (1)	**(3)**

Total for question 5 = 10 marks

Question number	Answer	Mark
6(a)(i)	B Bowman's capsule The only correct answer is **B** Bowman's capsule A is incorrect because structure X is not the glomerulus C is incorrect because structure X is not the collecting duct D is incorrect because structure X is not a capillary	(1)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	An explanation linking two from • the concentration of glucose has decreased (1) • as glucose is (re)absorbed (1) • by the cells of the first coiled tubule / into the blood / by active transport (1)	 accept the concentration has changed from 6 to 0 (millimoles per litre) accept definitions / descriptions of active transport	(2)

Question number	Answer	Additional guidance	Mark
6(a)(iii)	ureter	reject urethra	(1)

Question number	Answer	Mark
6(b)	A comparison including two from • both have some protein in their urine (1) • person A has less protein in their urine (than person B) (1) • amount of protein in the urine from person A is roughly the same / varies between 2 and 5 (arb units) / increases and then decreases (slightly) (1) • amount of protein in the urine from person B increases (each year) / changes from 25 to 106 (arb units) (1)	**(2)**

Question number	Answer	Additional Guidance	Mark
6(c)	An explanation including two from: • the kidney is less likely to be rejected (1) • {tissues / cells / blood} will match / have {same / similar} {genes /DNA / antigens} (1) • because tissues / cells will not cause an immune response (1) • the donor can live (well) with only one kidney (1)	accept the kidney will be a suitable match accept: the donated kidney will be healthy / will remove urea without losing other substances (1)	**(2)**

Total for question 6 = 8 marks

Question number	Answer	Additional guidance	Mark
7(a)(i)	Substitution 8:32 / 32 ÷ 8 (1) Simplest form 1:4 / 1 to 4	 accept 4 accept 1/4 Award full marks for answer without working	**(2)**

Question number	Answer	Additional guidance	Mark
7(a)(ii)	A description including two from: • (excess) amino acids (1) • are broken down (1) • in the liver (1)	 accept deamination	**(2)**

Question number	Answer	Mark
7(a)(iii)	A kidney The only correct answer is **A** kidney B is incorrect because the lungs do not remove most urea from the body C is incorrect because the liver does not remove most urea from the body D is incorrect because the stomach does not remove most urea from the body	**(1)**

Question number	Answer	Mark
7(b)(i)	D hypothalamus The only correct answer is **D** hypothalamus A is incorrect because the cerebral hemispheres do not control body temperature. B is incorrect because the medulla oblongata does not control body temperature C is incorrect because the cerebellum does not control body temperature	**(1)**

Question number	*Indicative content*	Mark
7(b)(ii)*	**(6 marks)** **How skin structures respond during hot weather** Gland • sweat glands • produce sweat Hair / muscle • (erector) muscle will relax • hairs will 'lie down' Capillary • capillary (loop) allows more blood to flow through it Nerve (endings) • detect heat • send nerve impulses to the brain / CNS / hypothalamus. **How responses help to reduce body temperature** Sweat • sweat will spread out onto the surface of the skin • sweat / water will evaporate • using heat from the body Hair • less air will be trapped • air is an insulator • so less insulation • so more heat lost from skin • through convection Capillary • more blood flows closer to surface of the skin • so heat has less distance to travel until it leaves the body • so less insulation for heat to travel though • so more heat is lost through convection / radiation	(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 fully 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 determined by how skin structures react to hot weather The mark within the level is determined by the link between the responses of structures to heat is lost within each description.
	0	No rewardable material	
Level 1	1–2	• A simple description of a response of the skin to hot weather. • A simple explanation of how the response causes heat loss.	<u>Possible candidate responses</u> • Sweat is produced from the gland. • The sweat evaporates.
Level 2	3–4	• A description of the way at least one structures respond to hot weather • An explanation of how this response causes heat loss.	<u>Possible candidate responses</u> • The muscle relaxes letting the hair lie flat against the skin. • There is less air trapped so there is less insulation.
Level 3	5-6	• A detailed description of how more than one structures respond to hot weather. • A detailed explanation of how these responses cause heat loss.	<u>Possible candidate responses</u> • Sweat from the sweat glands spreads on to the skin surface. More blood flows through the capillary so the blood is nearer to the surface of the skin. • The sweat will evaporate taking the heat with it. The blood will be nearer to the surface of the skin so more heat will be lost by radiation.

Total for question 7 = 12 marks

Question number	Answer	Additional guidance	Mark
8(a)	An explanation including the following: • lower surface (of leaf) is not in contact with air / is in water (1) • so gas exchange cannot occur (1)	 accept water would enter the stomata accept oxygen /carbon dioxide /water (vapour) accept reduced/no transpiration	**(2)**

Question number	Answer	Mark
8(b) (i)	D chloroplast The only correct answer is **D** chloroplast A is incorrect because the nucleus does not photosynthesise B is incorrect because the vacuole does not photosynthesise C is incorrect because the mitochondrion does not photosynthesise	**(1)**

Question number	Answer	Mark
8(b)(ii)	C sucrose The only correct answer is **C** sucrose A is incorrect because glycerol is not a sugar B is incorrect because although ribose is a sugar this is found in DNA D is incorrect because starch is not a sugar	**(1)**

Question number	Answer	Additional guidance	Mark
8(b)(iii)	A description including two from: • in the phloem (1) • dissolved (in water) (1) • by translocation (1) • using active transport (1)	 reject xylem accept by diffusion	**(2)**

Question number	Answer	Mark
8(c)(i)	An explanation linking three from the following: • because {conditions / named conditions} are suitable for {growth / photosynthesis} /conditions similar to native conditions /it is adapted to the conditions (1) • it outcompeted the natural plants (1) • therefore, it {grows / reproduces} (1) • as no natural herbivores {eat it / restrict it} (1)	**(3)**

Question number	Answer	Mark
8(c) (ii)	An explanation linking three of the following: • biodiversity is reduced / fewer {plants / plant species} / reduced number of {animals / animal species} (1) • (fewer plants because) less light reaches the water (1) • so less photosynthesis in plants below lilies (1) • lower oxygen concentration in water / oxygen is used up by decomposers (1) • (fewer animals because) less food for animals (1)	**(3)**

Total for question 8 = 12 marks

Question number	Answer	Mark
9(a)(i)	6 / six	**(1)**

Question number	Answer	Mark
9(a)(ii)	D cell wall, chloroplast, large vacuole. The only correct answer is **D** cell wall, chloroplast, large vacuole A is incorrect because both the cell membrane and nucleus are also found in animal cells B is incorrect because the cell membrane and cytoplasm are also found in animal cells C is incorrect because the nucleus is also found in animal cells	**(1)**

Question number	Answer	Additional guidance	Mark
9(b)(i)	Substitution (50 – 30 =) 20 (1) (20 ÷ 50 x 100 =) -40(%)	 Accept 40% Award full marks for answer without working	**(2)**

Question number	Answer	Additional guidance	Mark
9(b) (ii)	Any two from: • variety of potato (1) • mass of potato (1) • age of potato (1) • temperature (1) • storage conditions/humidity (1)	 accept type / species accept weight/size accept potato cells taken from the same part of each potato	**(2)**

Question number	Indicative content	Additional guidance	Mark
9(b)(iii)	for energy / respiration	ignore make / produce energy accept to produce ATP	**(1)**

Question number	Indicative content	Mark
9(c)*	**Plan for the investigation** • put a light (source) at a distance away from the pondweed • measure the volume of oxygen / count the number of bubbles • in a set time • repeat with the light at different distances **Variables and how to control them** **ambient light** • use darkened room / close curtains / turn lights out • use a light meter to measure light intensity • use the same light source at each distance **temperature (of water)** • use a heat shield • use a thermometer and add cold water as necessary **carbon dioxide concentration (in water)** • add sodium hydrogen carbonate to the water **bubbles contain different volumes of gas** • measure volume of oxygen in the test tube • replace the test tube with a measuring cylinder **acclimatisation period** • wait for the rate to settle down before you count the bubbles **amount of pondweed** • use the same pondweed each time.	(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 determined by the detail of the plan The mark within the level is determined by the number of variables and how to control them
	0	No rewardable material	
Level 1	1–2	• A simple answer stating at least one correct aspect of a plan • A reference to one variable that can be controlled	<u>Possible candidate responses</u> • Move the light to different distances. • You need to control the temperature of the water.
Level 2	3–4	• An answer that describes a workable plan • A detailed answer of how to control one variable OR a reference to more than one variable that need to be controlled	<u>Possible candidate responses</u> • Count the number of bubbles. Move the light further away and count again • Control the temperature of the water by using a water bath • Control the temperature of the water and close the blinds
Level 3	5-6	• A detailed workable plan • A detailed answer of how to control one variable AND at least one other reference to a different variable to be controlled	<u>Possible candidate responses</u> • Place the light at 10cm from the pondweed. Count the bubbles in one minute. Move the light to other distances and count the number of bubbles in one minute again. • Put a sheet of glass between the light and pondweed to stop it heating up. The amount of pondweed should be the same.

Total for question 9 = 13 marks

Question number	Answer		Mark
10(a)	7 (billion) (1) 0.91 (billion)	 award full marks for answer without working accept 910 000 000 for 1 mark	**(2)**

Question number	Answer	Additional guidance	Mark
10(b)	A description including: • add Biuret (reagent / solution) (1) • colour change (from blue) to mauve / purple (1)	 accept sodium hydroxide and copper sulfate	**(2)**

Question number	Answer	Additional guidance	Mark
10(c)	substitution (from graph) increase = 275 – 225 (= 50) (1) evaluation rate = 50 ÷ 10 = 5	 accept tolerance +/- 2 for graph readings accept values of 4.6 to 5.4 award full marks for answer without working	**(2)**

Question number	Answer	Additional guidance	Mark
10(d)(i)	An explanation including two from: • there is less energy in the cattle than in the plants (1) • not all of the energy from the plants is passed on to the cattle (1) • because not all plant material is digested / eaten (1) • and some energy is used for respiration / movement / metabolism (1)	accept plants are eaten by cattle accept excretion	**(2)**

Question number	Indicative content	Additional guidance	Mark
10(d)(ii)	An explanation linking three of the following: • there will be less food for people to eat (1) • farming meat does not produce as much food (per acre as arable farming) (1) • so more land used for {meat farming / animal feed} (1) • means less {arable land / food (crops) grown for humans} (1)	accept a diet including a large amount of meat has health implications e.g. high cholesterol (1)	**(3)**

Total for question 10 = 11 marks