Pearson
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Mark Scheme (Results)

Summer 2022

Pearson Edexcel GCSE
In Combined Science (1SC0) Paper 2BF

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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)	feeding / eating	accept digestion / absorption / nutrition	**(1)** **AO3 1a**

Question Number	Answer	Additional guidance	Mark
1(a)(ii)	photosynthesis (1) respiration (1)	answers must be in the correct order	**(2)** **AO2 1**

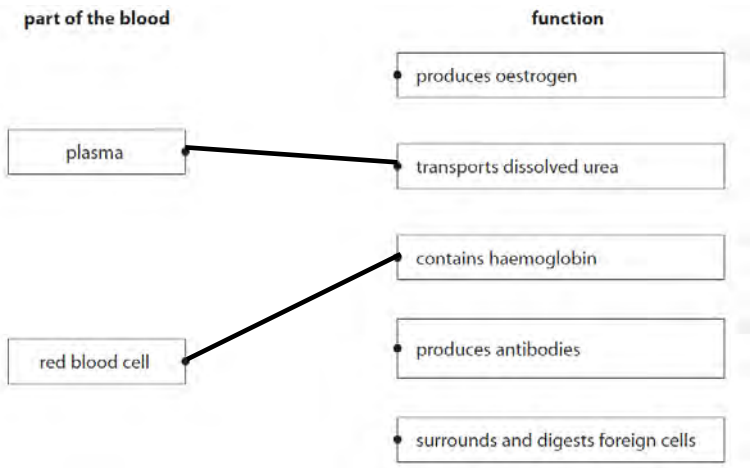
Question Number	Answer	Mark
1(a)(iii)	C microorganism **The only correct answer is C** ***A*** *is not correct because mammals are not decomposers* ***B*** *is not correct because producers are not decomposers* ***D*** *is not correct because trees are not decomposers*	**(1)** **AO1 1**

Question Number	Answer	Mark
1(b)	D desalination **The only correct answer is D** ***A*** *is not correct because excretion is not used to obtain fresh water from sea water* ***B*** *is not correct because precipitation is not used to obtain fresh water from sea water* ***C*** *is not correct because sterilisation is not used to obtain fresh water from sea water*	**(1)** **AO1 1**

Question Number	Answer	Mark
1(ci)	to remove objects / debris / named objects	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
1(cii)	to destroy pathogens / remove {other chemicals / named chemicals / ions / named ions}	Accept to make it taste better	**(1)** **AO1 1**

(Total for Question 1 = 7 marks)

Question Number	Answer	Mark
2(a)(i)		**(2)** **AO1 1**

Question Number	Answer	Mark
2(a)(ii)	Any two from: • round (1) • disc shaped (1) • biconcave / dimple / indented on each side / large surface area (1) • smooth (1)	**(2)** **AO2 1**

Question Number	Answer	Mark
2(b)(i)	A ribosomes **The only correct answer is A** ***B*** *is not correct because vacuoles, although important in secreting the proteins do not produce them.* ***C*** *is not correct because lymphocytes do not contain chloroplasts* ***D*** *is not correct because lymphocytes do not have flagella*	**(1)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
2(b)(ii)	10 x 400 (1) 4000 (*μm)*	award full marks for correct answer with no working	**(2)** **AO2 2**

Question Number	Answer	Mark
2(b)(iii)	C 1000 **The only correct answer is C** ***A*** *is not correct because there are 1000 μm in 1 mm* ***B*** *is not correct because there are 1000 μm in 1 mm* ***D*** *is not correct because there are 1000 μm in 1 mm*	**(1)** **AO1 1**

(Total for Question 2 = 8 marks)

Question Number	Answer	Mark
3(a)(i)	To make the { cell / nucleus } more visible	**(1)** **AO2 2**

Question Number	Answer	Mark
3(a)(ii)	D cell wall **The only correct answer is D** ***A*** *is not correct because V is not a chloroplast* ***B*** *is not correct because V is not a vacuole* ***C*** *is not correct because V is not a nucleus*	**(1)** **AO1 2**

Question Number	Answer	Mark
3(a)(iii)	An explanation including two from: • water moved out of cell / cytoplasm (1) • by osmosis / definition of osmosis (1)	**(2)** **AO2 2**

Question Number	Answer	Mark
3(b)	A description linking three from: • use forceps to {pick up / peel} a (thin layer of) onion (cells) (1) • place (onion cells) onto microscope slide (1) • add a drop of stain / named stain (1) • place coverslip on top (of onion) (1) • lower coverslip slowly / at an angle (1)	**(3)** **AO1 2**

Question Number	Answer	Additional Guidance	Mark
3(c)	Any two from the following: • at any point between 0 to 0.33 {mass / water} is gained (1) • from 0 to 0.33 the change in mass decreases (1) • 0.33 is where the concentration inside and outside (of the cell) is the same (1) • above 0.33 {mass / water} is lost (1) • from 0.33 to 1.0 the change in mass increases (1)	accept 0.33 mol/dm^3 is the isotonic point	**(2)** **AO3 2a 2b**

(Total for Question 3 = 9 marks)

Question Number	Answer	Mark
4(a)(i)	C glucose and oxygen **The only correct answer is C** ***A*** *is not correct because carbon dioxide and water are not products of photosynthesis* ***B*** *is not correct because water is not a product of photosynthesis* ***D*** *is not correct because carbon dioxide is not a product of photosynthesis*	**(1)** **AO1 1**

Question Number	Answer	Mark
4(a)(ii)	Any two from: • increasing light intensity increases rate of photosynthesis / number of bubbles per minute (1) • credit specific examples using manipulated data from the table (1)	**(2)** **AO3 1a 1b**

Question Number	Answer	Mark
4(a)(iii)	A description including two from: • video the investigation / plant (1) • play back (in slow motion) and count the bubbles (1) OR • collect bubbles / gas produced / use a (gas) syringe (1) • measure volume of gas (collected) (1) OR • repeat the investigation (at each light intensity) (1) • calculate a mean (1)	**(2)** **AO3 3b**

Question Number	Answer	Mark
4(a)(iv)	A description including three from: • change temperature of water (1) • use thermometer / temp probe (to monitor temperature of water) (1) • use a water bath (to keep each temperature constant) (1) • count the bubbles at each temperature (for set time) (1) • control a variable e.g., keep pond weed / light intensity / volume of water the same (1)	**(3)** **AO3 3a**

Question Number	Answer	Mark
4(b)	An explanation linking: • nitrates cause algal bloom / {rapid / excessive / over} growth of algae (1) • algae / water plants (lower in the water) are deprived of light (1) • these algae / water plants die (1) • oxygen concentration in water decreases (due to decomposition) / less photosynthesis (1) • so fish die (1)	**(3)** **AO1 1**

(Total for question 4 = 11 marks)

Question Number	Answer	Mark
5(a)(i)	vacuole / cell sap / sap accept: phonetic spellings of vacuole do not accept vacuum	**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	An explanation linking two from: • being long (1) • has a large surface area / gives more area (1) • to increase **rate** for absorption. (1) OR • root hair has a thin (cell) wall (1) • to reduce the distance water and mineral ions have to travel (1) • to increase **rate** for absorption. (1)	accept contains many mitochondria (1) to release energy / for active transport (1)	**(2)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
5(b)(i)	B mitochondria **The only correct answer is B** ***A*** *is not correct because vacuoles do not release energy* ***C*** *is not correct because nuclei do not release energy* ***D*** *is not correct because ribosomes do not release energy*		**(1)** **AO1 1**

Question Number	Answer		Mark
5(b)(ii)	An answer including: • thick walls (1) • continuous / hollow tubes/no end walls (1)	accept no cytoplasm accept made of lignin / made of dead cells (1)	**(2)** **AO2 1**

Question Number	Answer	Mark
5 (c)(i)	An explanation including **three** from: • fan causes air to move / creates wind / increased air flow (1) • water (vapour) removed (from around leaf) (1) • **increased** {rate of diffusion/evaporation/transpiration} (of water vapour from leaf) (1) • causing the plant to take up (more) water (1)	**(3)** **AO2 2**

Question Number	Answer		Mark
5(c)(ii)	• to compare (the effect) / as a control	accept to get a baseline measurement	**(1)** **AO2 2**

Question Number	Answer	Additional guidance	Mark
5(c)(iii)	68 – 52 / 16 (1) (16 ÷ 2) 8 (mm^3 per minute)	award full marks for correct answer with no working ecf for incorrect graph readings for 1 mark	**(2)** **AO2 1**

(Total for question 5 = 12 marks)

Question Number	Answer	Additional guidance	Mark
6(a)(i)	An explanation linking: • artery has a {thicker /more muscular} wall (1) • because of the (blood) pressure (higher in artery than in vein) (1)	 accept prevent the artery bursting / maintain blood pressure	**(2)** **AO2 1**

Question Number	Answer		Mark
6(a)(ii)	valve/valves		**(1)** **AO1 1**

Question Number	Answer	Additional guidance	Mark
6(b)(i)	5 x 60 = 300 (1) or 60 ÷ 100 = 0.6 (1) (300 ÷ 100) = 3 (dm^3)	award full marks for correct answer with no working accept other correct methods of calculation which is a percentage calculation	**(2)** **AO2 1**

Question Number	Answer	Mark
6(b)(ii)	An explanation linking: • because (during exercise muscles) require **more** {oxygen / glucose} (1) • for respiration / to release energy (1) OR • to remove **more** carbon dioxide / to remove lactic acid (1) • as this is a product of respiration (1)	**(2)** **AO2 1**

Question Number	**Indicative content**	Mark
6(c)*	**Functions linked to structures** • walls contract / the heart pumps blood • atria push blood down into the ventricles • ventricles pumps blood out of heart • left ventricle / side pumps {blood to the body / oxygenated blood} • right ventricle/ side pumps {blood to the lungs / deoxygenated blood}. • left ventricle wall thicker (than right ventricle wall) / produces more pressure to pump blood • right ventricle is thinner / produces less pressure to pump blood • valves prevent backflow /named valves prevent backflow between specific parts of the heart • the muscles can contract faster / harder so that blood is pushed around the body faster • the septum stops (oxygenated blood mixing with deoxygenated blood) • named arteries / veins related to where blood is going to / coming from	**(6)** **AO1 1**

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.

Additional Guidance

Level	Mark	Additional Guidance	General additional guidance The level is determined by the functions covered in the response The mark within the level is determined by linking the functions to their related structures
	0	No rewardable material	Possible candidate responses
Level 1	1–2	• An isolated function is identified • the function is linked to a relevant structure	• the heart pumps blood around the body • the heart pumps blood around the body when the muscles contract.
Level 2	3–4	• more than one function is identified • the functions are linked to their relevant structures	• when the heart contracts, blood is forced into the arteries. The blood on the left side does not mix with the blood on the right side. • the left ventricle has thicker walls that push blood out through the aorta to the body under high pressure.
Level 3	5-6	• at least three functions are identified • the functions are linked to their relevant structures	• the atria push the blood into the ventricles. This can only go this way blood can't go back up into the atria. When the ventricles contract the left walls are thicker than the right so put the blood under more pressure. • the two sides are separated by a wall of muscle which stops the oxygenated and the deoxygenated blood mixing. Blood flows back to the heart in veins. This flows into the atria which contract pushing blood into the ventricles.

(Total for question 6 = 13 marks)

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