Pearson Edexcel

Mark Scheme (Results)

Summer 2023

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

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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

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

Question number	Answer	Additional guidance	Mark
1(a)(ii)	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
1(b)(i)	insulin	**(1)**

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

Question number	Answer	Mark
1(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
1(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 1 = 9 marks)

Question number	Answer	Mark
2(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
2(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
2(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
2(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	Answer	Mark
2(c)(ii)	An explanation linking: • tube A - respiration took place (producing carbon dioxide) / photosynthesis did not take place (1) • tube B – photosynthesis took place (using up the carbon dioxide) (1)	**(2)**

(Total for question 2 = 9 marks)

Question number	Answer	Mark
3(a)(i)	to maintain a constant temperature / as a heat shield	(1)

Question number	Answer	Additional guidance	Mark
3(a)(ii)	Any **two** from: • extraneous light (1) • temperature (1) • volume of pond water (1) • {length / mass / type} of pond weed (1) • carbon dioxide concentration (1)	 accept use the same light bulb/source ignore amount / size of pondweed	(2)

Question number	Answer	Additional guidance	Mark
3(b)(i)	(light intensity $\propto$) $\frac{1}{d^2}$ (1) $1 \div \{25^2 / 625\}$ (1) 0.0016 (arbitrary units)	accept a written equation Correct answer with no working is full marks	(3)

Question number	Answer	Mark
3(b)(ii)	An explanation including **two** of the following: • collect the gas produced (1) • using a **gas syringe** / measuring cylinder (1) • to get a measurement of volume of {oxygen / gas} (1) OR • use a video camera / data logger (1) • playback in slow motion and count the bubbles (1)	(2)

Question number	Answer	Additional guidance	Mark
3(c)	A plan including three from the following: • keep the light at the same distance from the pondweed (1) • count the number of bubbles / measure the oxygen produced (1) • repeat at different temperatures (1) • control {carbon dioxide concentration / mass of pond weed} (1)	 accept keep the same light intensity accept collect the oxygen accept gas for oxygen accept type of pondweed	**(3)**

(Total for question 3 = 11 marks)

Question number	Answer	Mark
4(a)(i)	oxygen / O_2	(1)

Question number	Answer	Mark
4(a)(ii)	carbon dioxide / CO_2	(1)

Question number	Answer	Mark
4(a)(iii)	An explanation including the following: • by diffusion (1) • down a concentration gradient / from high concentration to a low concentration (1) • through a membrane (1)	(3)

Question number	Answer	Additional guidance	Mark
4(a)(iv)	An explanation including **three** from the following: • to reduce the distance over which diffusion occurs (1) • makes the blood flow slower (1) • increases the surface area (1) • to increase {diffusion / gas exchange} (1) • to **maximise** the amount of oxygen taken up by the **red blood cells** (1)	accept large surface area accept more time to diffuse accept the reverse argument for oxygen being released	(3)

Question number	Answer	Mark
4(b)	calculation (280 x 0.25 =) 70 (1) m^2 (1)	(2)

(Total for question 4 = 10 marks)

Question number	Answer	Mark
5(a)(i)	The only correct answer is **C 320 pg/ml** A is incorrect because this is the reading for progesterone B is incorrect because this is the second peak reading for oestrogen D is incorrect because this is the reading for LH	(1)

Question number	Answer	Mark
5(a)(ii)	An explanation including three of the following: • FSH causes the {egg / follicle} to mature (1) • FSH stimulates oestrogen (1) • **high levels** of oestrogen (1) • LH / LH surge (1) • causes the egg to be released (1)	(3)

Question number	Answer	Mark
5(a)(iii)	3 / three (days)	(1)

Question number	Answer	Mark
5(a)(iv)	An explanation including the following: • FSH levels remain low as no {egg / follicle} would mature (1) • LH levels remain low so ovulation would not occur (1) • progesterone inhibits {FSH / LH} / oestrogen inhibits FSH (1) • progesterone levels remain high to maintain the lining of the uterus (1) • high levels of oestrogen {build up / maintain} the lining of the uterus (1)	**(4)**

(Total for question 5 = 9 marks)

Question number	Answer	Mark
6(a)(i)	6000 μm 6×10^3 6.0×10^3 Reject 6×10^{-3}	**(1)**

Question number	Answer	Additional guidance	Mark
6(a)(ii)	6 ÷ 150 (1) 0.04 (mm) (1) 4.0×10^{-2} (mm)	 accept 4×10^{-2} for full marks	**(3)**

Question number	Answer	Additional guidance	Mark
6(b)	A description linking the following: • (denitrifying bacteria) convert nitrates (1) • back into (atmospheric) nitrogen (1)	 accept nitrites	**(2)**

Question number	Indicative content	Mark
*6(c)	**AO1** **Biotic** **Plants** • During photosynthesis plants take in carbon dioxide from the atmosphere • During respiration plants release carbon dioxide into the atmosphere • Plants store carbon compounds e.g. glucose • Carbon is transferred to animals when they are eaten **Animals** • Animals release carbon dioxide when they respire • Animals ingest carbon compounds e.g. glucose when they eat plants or animals **Decomposers** • Decomposers release carbon dioxide • during respiration • Decomposers break things down **Abiotic** • Burning fossil fuels releases carbon dioxide or carbon (particulates) into the atmosphere • The oceans can absorb carbon dioxide • Carbon can be stored in carbonate rocks • Erosion of carbonate rocks releases carbon dioxide • Volcanoes releasing carbon dioxide	**(6)**

Level	Mark	Indicative content
	0	No rewardable material.
Level 1	1–2	• a simple description one way in which carbon is cycled • linked to a process involved
Level 2	3–4	• A detailed description of how carbon is cycled in the biotic or abiotic environment or a simple description of how carbon is cycled in each environment • Linked to two different processes involved
Level 3	5–6	• A detailed description of how carbon is cycled in the biotic and abiotic environment including the role of plants, animals and decomposers • Linked to the processes of respiration and photosynthesis and an abiotic process

(Total for question 6 = 12 marks)