



Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced Level in Biology

WBI16/01A

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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	Additional Guidance	Mark
1(a)(i)	An answer that includes the following: • (independent variable) temperature (1) • (dependent variable) number of bubbles per {minute / unit time} (1)		(2)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	A description that includes the following: • (measuring / calculating) volume of {oxygen / gas} (produced per unit time) (1) • description of method (1)	ACCEPT collect gas ACCEPT use of (gas) syringe or movement of bubble in capillary tubing	(2)

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	An answer that includes four marking points taken from a maximum of two explanations: - pieces of pondweed should be of equal {length / mass} (1) - so number of cells photosynthesising is {equal / the same} (1) OR {measured / same} distance between lamp and beaker (1) - so light intensity is equal (1) OR - adding sodium hydrogen carbonate to beaker / bicarbonate (1) - so (concentration of) CO₂ is not limiting / in excess (1) OR - leaving pondweed to acclimatise before collecting results (1) - so enzymes are working at the desired temperature (1)	ACCEPT control length / mass, same number of / area of leaves do not accept suitable ACCEPT an explanation of how this may affect rate e.g. bigger piece would produce more bubbles than smaller ACCEPT an explanation of how this may affect rate e.g. brighter light or lamp nearer would produce more bubbles than dimmer or further away DO NOT ACCEPT enough CO₂ ACCEPT an explanation / equilibrate ACCEPT an explanation	(4)

Question Number	Answer	Additional Guidance	Mark
1(a)(iv)	An answer that includes the following: so that mean AND standard deviation can be calculated (1)	ACCEPT to measure variability / identify anomalies	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	An explanation that includes four of the following: - as temperature increases, the rate of photosynthesis increases (up to a certain point) 1) - because) photosynthesis relies on enzymes / named enzyme, e.g. RUBISCO (1) - because there is more kinetic energy (1) - therefore, there are more collisions (between enzyme and substrate) (1) - per unit time (1) - at (very) high temperatures {enzymes are denatured / substrate cannot bind with enzyme / ES complexes cannot form} (so rate of photosynthesis decreases) (1)	ACCEPT answer in terms of lower temperature for mp 1, 3 ,4 ACCEPT more ES complexes , ACCEPT frequency / rate of collision increases for mps 4 and 5 ACCEPT active site changes shape for denatured	(4)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	35.2 (bubbles per minute)	ACCEPT 35 (bubbles per minute) ACCEPT any value between 35.2 and 52.8 (35 and 53) ACCEPT rate = $17.6 \times Q_{10}$	(1)

(Total for Question 1 = 14 marks)

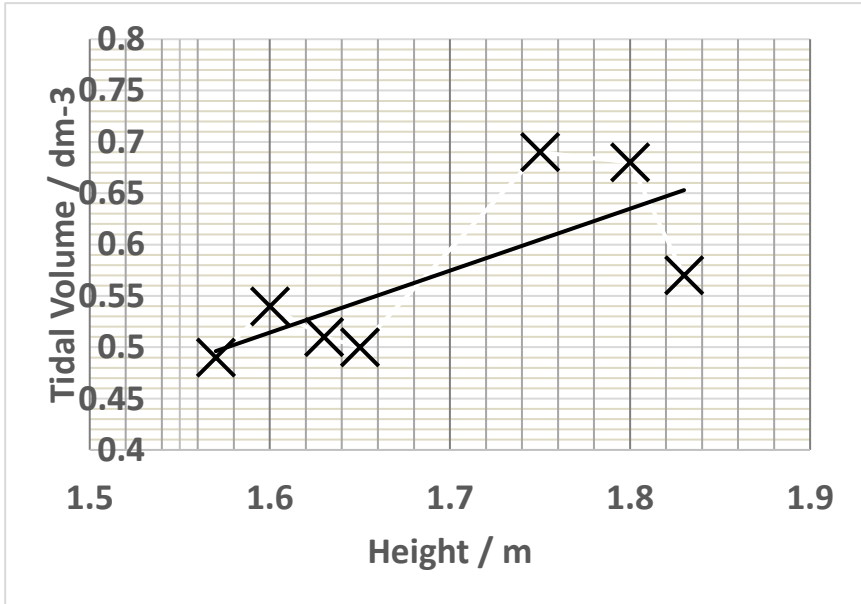
Question Number	Answer	Additional Guidance	Mark
2(a)(i)	An answer that includes the following: - estimation of {tidal volume / number of breaths per minute} (1) - calculation of respiratory minute ventilation (1)	Sample calculation ACCEPT a value in the range 0.45 to 0.55 for tidal volume OR ACCEPT a value in the range 10.5 - 11.5 or breaths per minute ACCEPT any value between 4.7 and 6.4 Correct answer with no working is 2 marks	(2)

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	An answer that includes the following: - answer in the correct range (1) - answer given to two significant figures (1)	Sample calculation ACCEPT 0.14 - 0.16 (dm³ per minute) 0.14 -0.16 REJECT -0.15 correct answer with no working gains full marks	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	there is no (significant) correlation between the height of a person and their tidal volume (1)	candidates will express this in different ways ACCEPT the reverse correlation	(1)

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	An answer that includes two of the following: - temperature (of room) (1) - humidity (1) - altitude / height above sea level (1) {air quality / pollution} (1)	ACCEPT oxygen {concentration / partial (pressure) (of oxygen in the air),	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	An answer that includes two of the following: {body mass / BMI} (1) (biological) sex (1) - age (1) - fitness level (1) {health / lung disease} (1)	% body fat ACCEPT weight IGNORE gender ACCEPT whether male OR female ACCEPT description e.g. exercise level, resting heart rate, level of muscle development ACCEPT just disease or described e. g health issues ACCEPT suitable named disease, e.g. asthma ACCEPT other suitable factor, e.g. playing wind instrument	(2)

Question Number	Answer	Additional Guidance	Mark																		
2(b)(iv)	- axes labelled including units (1) - data plotted correctly on linear scales, can start at non-zero (1) (in scatter graph format) with a line of best fit (1)	Height / m and Tidal Volume / dm³ DO NOT ACCEPT extrapolation for mp3  <table><caption>Data points from the scatter plot</caption><thead><tr><th>Height / m</th><th>Tidal Volume / dm³</th></tr></thead><tbody><tr><td>1.57</td><td>0.49</td></tr><tr><td>1.60</td><td>0.54</td></tr><tr><td>1.62</td><td>0.51</td></tr><tr><td>1.64</td><td>0.50</td></tr><tr><td>1.65</td><td>0.51</td></tr><tr><td>1.75</td><td>0.70</td></tr><tr><td>1.80</td><td>0.68</td></tr><tr><td>1.83</td><td>0.57</td></tr></tbody></table>	Height / m	Tidal Volume / dm ³	1.57	0.49	1.60	0.54	1.62	0.51	1.64	0.50	1.65	0.51	1.75	0.70	1.80	0.68	1.83	0.57	(3)
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Question Number	Answer	Additional Guidance	Mark
2(c)(i)	- calculation of an intermediate step - calculation of r_s	Sample calculation ACCEPT $6 \sum d^2 = 96$ and $n(n^2 - 1) = 336$ OR $\frac{6 \sum d^2}{n(n^2 - 1)} = 0.2857143$ $r_s = 0.714 / 0.71 / 0.7143$ ACCEPT correct fraction 5/7 Correct answer with no working gains full marks	(2)

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)	An explanation that includes the following: - the calculated value of r_s (0.714) is less than the critical value 0.786 therefore accept the null hypothesis (H_0) (1) - there is no (significant) correlation between height and tidal volume (1) - height has no effect on tidal volume (1)	ALLOW ecf from 2ci for mp2 and 3 ACCEPT critical value is 0.929 at a significance level of 0.01%	(3)

(Total for Question 2 = 17 marks)

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	A description that includes three of the following: • find a suitable strain of yeast for (measurable) respiration to occur (1) • find a suitable {concentration / mass / volume} of yeast for (measurable) respiration to occur (1) • find a suitable mass of sugar for (measurable) respiration to occur (1) • find a suitable timescale for (measurable) respiration to occur (1) • find a suitable {temperature / pH} for (measurable) respiration to occur (1)	ACCEPT any of the mps in the context of (measurable) {respiration to occur / volume of gas} if mentioned once If there is no mention of what the suitable conditions are for, then can give only two marks if there are three ideas, one mark if there are two ideas and no marks if there is only one idea ACCEPT concentration of sugar IGNORE REDOX indicator suitability IGNORE ref. to lactate	(3)

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	An answer that includes the following: • suitable risk identified (1) • suitable control identified (1)	IGNORE contamination any reasonable risk identified e.g. allergy to yeast / allergy to redox indicator / redox indicator is an irritant to skin and eyes IGNORE just allergy any corresponding control identified e.g. use of gloves or goggles	(2)

Q Number	Answer	Additional Guidance	Mark
3(b)	An answer that includes nine of the following: 1. clear statement of the dependent variable (1) 2. use of anaerobic conditions (1) 3. mix yeast and sugars(s) (1) 4. allow {yeast/sugar} (mixtures) to equilibrate before starting measurements) (1) 5. incubate at {same / stated} temperature (1) 6. use same or stated volume of {sugar solution / yeast (suspension)} (1) 7. same concentration of sugar solution(s) used (1) 8. use same strain/source of yeast (1) 9. method of measuring DV (1) 10. repeats and calculation of mean values and SD (1)	e.g. volume of CO₂ in unit time / volume of ethanol in unit time / time to change colour of (REDOX) indicator / solution e.g. exclude oxygen or a method described e.g use of airlock / sealing the apparatus / layer of oil ACCEPT glucose or sucrose or both ACCEPT either yeast or sugar if they mention equilibrate temp range 20 - 35° C ACCEPT mass DO NOT ACCEPT species or age e.g. (gas) syringe / respirometer for CO₂ eg. distance moved by a bubble or liquid / ethanol concentration via distillation or titration / hydrometer / time to change colour of REDOX indicator in context of a stop clock	(9)

Question Number	Answer	Additional Guidance	Mark
3(c)	A description that includes the following: - raw data table related to anaerobic respiration with appropriate headings, units and means calculated from repeats (1) - bar graph with labelled axes (1) - use of an appropriate statistical test for difference (1)	ACCEPT description of calculating mean or mean on graph as the mean needed for the table units must be time related (e.g. $\text{dm}^3 \text{ min}^{-1}$) do not accept units in the body of the table e.g. t-test	(3)

Question Number	Answer	Additional Guidance	Mark
3(d)	An answer that includes two of the following: - uneven distribution of {yeast / sugar solution} (1) - difficult to judge end point (if redox indicator used) (1) - aerobic respiration may occur if yeast is not left to use oxygen (before data collection starts) (1) {waste products / ethanol} may build up (1) - hard to control age of yeast culture (1) - temperature hard to control (due to respiratory heat production) (1)	DO NOT ACCEPT contamination IGNORE pH ACCEPT solutions not mixed properly ACCEPT difficult to measure {volume of gas produced / distance moved by liquid / {volume / mass of alcohol}} ACCEPT oxygen may be present / aerobic respiration may occur. hard to make sure there is no oxygen	(2)

(Total for Question 3 = 19 marks)