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Mark Scheme (Results)

October 2020

Pearson Edexcel International Advanced Subsidiary Level
In Biology (WBI13)
Paper 01: Practical Skills in Biology I

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October 2020
Publications Code WBI13_01_2010_MS
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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.

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Question Number	Answer	Additional Guidance	Mark
1(a)	An explanation that includes the following points: • there is an intake of water (1) • (down a) water potential gradient outside to inside / (from) high WP to low WP / (from) low salt concentration (outside) and a high salt concentration (inside) (1) • by osmosis /described (1)	ACCEPT moves down a concentration gradient, in context of water entering. ACCEPT correct reference to hypo/hypertonic	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	A description that includes five of the following points: • cut pieces of same {size / surface area / potato} (1) • find mass of each piece before and after soaking (1) • soak pieces in solutions for {same length of time / stated time} (1) • blot dry before weighing (1) • repeat for each solution (1) • description of how percentage change calculated (1)	ACCEPT correct equation	**(5)**

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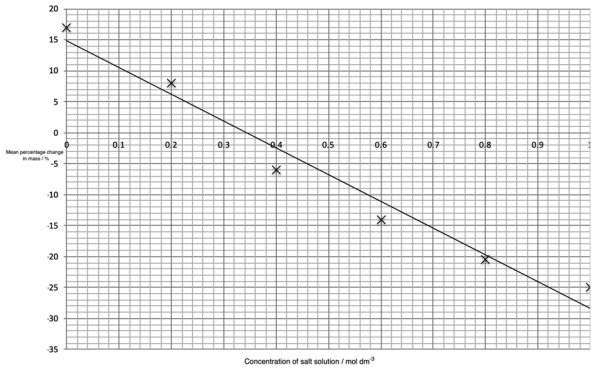
Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	A graph showing the following features: • A axes correct (x – concentration of sodium chloride, y - mean percentage change in mass) (1) • L axes correctly labelled, and with units for x mol dm^{-3} (1am4) • P correct plotting on suitable linear scales (1) • S suitable line of best fit drawn (1)	 S-NOT dot to dot, some points on either side	**(4)**

Question Number	Answer	Additional Guidance	Mark
1(b)(iii)	An answer showing the following stages: • correct reading, from their graph in bii, of where line of best fit crosses 0% change in mass (1) • use of this reading in biii graph to obtain water potential (1)	ecf applies e.g. 0.35 (mol dm^{-3}) e.g. -1.7 (MPa) allow 0.1 MPa either side for any mol dm^{-3} reading	**(2)**

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Question Number	Answer	Additional Guidance	Mark
1(c)	An explanation that makes reference to three of the following points: • the water potential falls initially, because {water is being lost / potatoes dry out} (1) • fall in water potential levels off later because no longer a wp gradient / wp inside and out has reached equilibrium (1) • water loss causes solute concentration in potato tissue cells to increase (1)	ACCEPT reference to up to week 11 ACCEPT evaporates from potato ACCEPT reference to week 7 or beyond ACCEPT solute potential decreases	**(3)**

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Question Number	Answer	Additional Guidance	Mark
2(a)(i)	A description that makes reference to the following points: • glucose and fructose (1) • joined by glycosidic bond (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	• pH or Ph or PH	ignore concentration, level or any other extra to pH. ACCEPT acidity, alkalinity	**(1)**

Question Number	Answer	Additional Guidance	Mark
2(a)(iii)	An answer that makes reference to the following points: • temperature affects {action / reaction rate / number of (S and E) collisions} of enzyme (1) • (25°C) {may be / is} optimum (for invertase) / gives rate which is not too fast or slow / (1)	ACCEPT so that only pH affects rate ACCEPT above 25°C denatures enzyme	**(2)**

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Question Number	Answer	Additional Guidance	Mark
2(a)(iv)	• invertase / sucrose concentration (1)	ACCEPT substrate / enzyme	**(1)**

Question Number	Answer	Additional Guidance	Mark
2(a)(v)	A description that makes reference to the following points: • dissolve a stated mass of {invertase / sucrose} in a stated volume of water / use a stock solution of {sucrose / invertase} (1) • use the same volume of this solution for each pH (1)	ecf from aiv	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(a)(vi)	An explanation that makes reference to the following points: • the rate slows down as {sucrose is used up / sucrose becomes limiting} (1) • so (rates / results} cannot be compared (1)	ACCEPT converse argument ACCEPT substrate ACCEPT converse argument	**(2)**

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Question Number	Answer	Additional Guidance	Mark
2(a)(vii)	An answer that makes reference to the following points: • measure the mass of {sucrose broken down / products formed} at intervals over time (1) • plot a graph of mass (y) against time (x) (1) • find the gradient of the graph at its start (1)	ACCEPT concentration / quantity / amount	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	A table showing the following features: • suitable table drawn (1) • headings of pH and Initial rate of reaction as a percentage of the maximum initial rate (1) • all data correctly entered (1)	example table pH | Initial rate of reaction as a percentage of the maximum initial rate 3.5 | 45 4.5 | 84 5.5 | 100 6.5 | 90 7.5 | 74 8.5 | 33	**(3)**

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Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	An answer which includes the following points: • (from these results, the conclusion is valid as) the highest initial rate measured is at pH 5.5 (1) • measurements at (smaller) intervals {were not made / should have been made} (1) • optimum might be anywhere (else) between 4.5 and 6.5 (1)	ACCEPT converse argument	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(c)	An answer which includes at least one similarity and one difference: Similarities: • both show an optimum (1) • both have same / similar activity at 70 C (1) Differences • optimum is at a lower temperature for immobilised than non-immobilised (1) • temperature affects immobilised enzymes more (1)	ACCEPT both rise to a point and then fall ACCEPT converse, correct figures quoted ACCEPT converse	**(3)**

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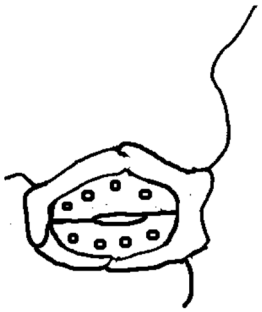
Question Number	Answer	Additional Guidance	Mark
3(a)(i)	A drawing showing the following features: • chloroplasts shown in each guard cell (1) • pore clearly shown (1) • cell walls shown correctly (1)	Example of drawing: 	**(3)**

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Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	An answer showing the following steps: • pore measured (3 epgu), length of pore in metres calculated (1) • conversion to μm done correctly (1) OR • epgu converted to μm correctly (1) • 3 μm multiplied by number of epgu correctly (1)	ecf applies Example of calculation: $3 \times 10^{-6} \times 3 = 9 \times 10^{-6}$ m therefore, pore is 9μm $3 \times 10^{-6} = 3$ μm $3 \times 3 \times 10^{-6} = 9$ μm	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	• correct scale shown on x axis one 1cm box = 250 ppm (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	• standard deviations correctly plotted (1)		**(1)**

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Question Number	Answer	Additional Guidance	Mark
3(b)(iii)	An answer that makes reference to the following points: • the SDs for pore area at the two values do not overlap (1) • at 2550 ppm lowest area is 4700, at 1300 highest is 4260 (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(iv)	An answer showing the following steps: • relevant figures substituted into the equation (1) • correct answer given (1)	<u>Example of calculation</u>: $y = (2.8 \times 6500) - 397.5$ $= 17802.5\ (\mu m^2)$	**(2)**

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