Mark Scheme (Results)

January 2023

Pearson Edexcel International Advanced Level
In Biology (WBI13)
Paper 01 Practical, Biology and Research Skills

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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 two of the following points • {position / location} of (cells / tissues) within (bundles / stem) (1) • size (of cells) / cell wall thickness (1)	Ignore incorrect names Accept pattern	(2)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	An answer that includes the following points: • B (1) • phloem (1) • the cells {are sieve tubes / have (sieve) plates / end walls} (1)	Accept partitioned	(3)

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	An answer that includes the following steps: • measurement of cell {diameter / radius} in epg units and conversion to m (1) • calculation of area using πr^2 (1)	ACCEPT 14 to 14.5 as alternatives to 13. e.g. {13 / 6.5} x 3 x 10^{-6} = 39 x 10^{-6} = *3.9 x 10^{-5}* OR 19.5 x 10^{-6} = *1.95 x 10^{-5}* π x ((1.95×10^{-5})^2)= 1.195 x 10^{-9} OR 3.14 x 3.8025 x 10^{-10} **= 1.194 x 10^{-9}** ACCEPT **1.195, 1.19, 1.2** If include units must match answer, but units not needed	**(2)**
Question Number	Answer	Additional Guidance	**Mark**
1(a)(iv)	• division of area of F by area given of E (1)	ecf from 1aiii eg 1.194 ÷ 0.0613 = 19.5 times	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(a)(v)	An description that includes the following points: • description of cutting thin section (1) • use of {stain / dye} (1) • place section (on slide) under coverslip (1) • draw under low power / described (1)	e.g use of razor, botanical razor, sharp knife, scalpel, cutting transverse, horizontal ignore name NOT HP for drawing, ignore of they go on to HP so long as clear they would draw under LP.	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	A drawing showing the following features: • correct cell outline and ratio width to length (1) • correct outline, dimension and location of nucleus with nucleolus (1) • three correct labels (1)	Ignore cytoplasmic inclusions e.g., longer than wide e.g., top and about half total area nuclear pores drawn negate this mark if they *just* draw nucleus judge proportions and nucleolus position for mp2 e.g. correct outline, dimension and location of nucleolus	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	An answer that includes the following points: Difference: • nuclear envelope double membrane, cell membrane single OR • {nuclear pore present in nuclear envelope, not in cell membrane / cell membrane has channels} (1) Similarity: • both membranes are phospholipid (bilayer) (1)	Accept functional aspects, e.g. Difference: description of transport of different substances Similarity: both control movement of {substances / relevant named} NOT lipoprotein	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(a)	An answer that includes: • two structures named (1) • third structure named (1)	e.g. chloroplast, amyloplast, mitochondria, Golgi body, rough ER, smooth ER, lysosome	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	A table drawn with the following features: • suitable table drawn (1) • headings with units (1) • all data correctly entered (1)	<table><tr><th>Concentration of chemical / ppm</th><th>Concentration of ions released / a.u.</th></tr><tr><td>15</td><td>5</td></tr><tr><td>25</td><td>40</td></tr><tr><td>50</td><td>80</td></tr><tr><td>75</td><td>140</td></tr><tr><td>100</td><td>160</td></tr><tr><td>125</td><td>230</td></tr><tr><td>150</td><td>250</td></tr></table>Allow leeway of 1 either way on concentrations on x extra data (pigment) loses mp 3	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	An answer that includes the following points: • as concentration (of chemical) increases conc. of pigment and ions (released) increase (1) • thus {permeability / described} (to both ions and pigment) increases (1) • permeability to ions less than to pigment (1) • there is no indication of variability in the data (1)	ACCEPT Positive correlation ACCEPT no SD / error bars	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	An answer that includes the following points: • equal sized pieces of plant tissue cut (1) • washed (in distilled water until no more pigment lost) (1) • placed in a range of 7 concentrations of the chemical shown (1) • samples of the liquid (around the discs) were removed / tissue removed from tube (1) • method for measurement of intensity of colour described (1) • one variable identified	Accept alternatives e.g.mass Accept rinsed Allow 8 if it is clear one is distilled water or 0% colorimeter (or implied), looking down tubes, compare with colour standard e.g. temperature, pH, time in water, volume of solution	**(5)**

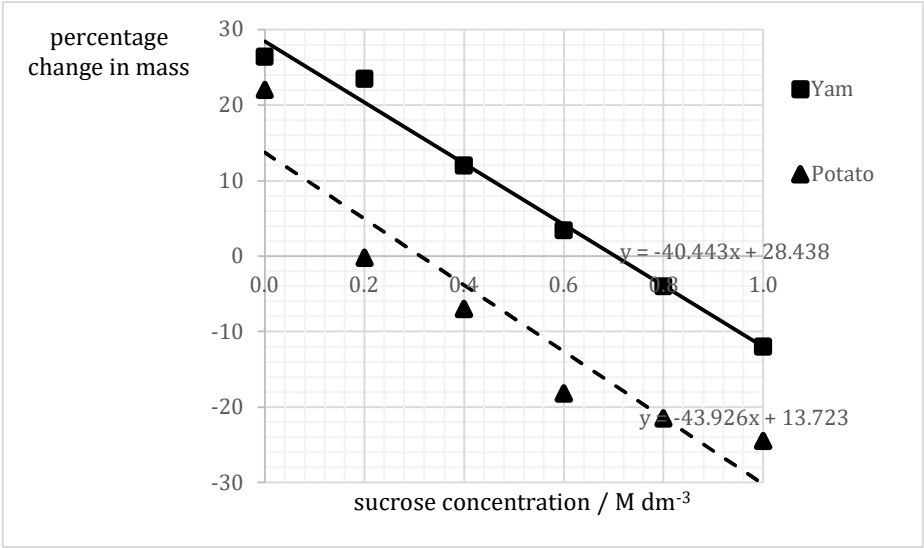
Question Number	Answer	Additional Guidance	Mark
2(c)	An explanation that includes the following points: • chemical {damages/destroys} membranes (1) • pigment leaks later than ions / described (1) • pigment in vacuole (only) (1) • it will take more time for tonoplast and cell membrane to be damaged than for just the cell membrane (1)	Ignore wall Accept in tonoplast	**(4)**

Question Number	Answer	Additional Guidance	Mark
3(a)	An answer that includes the following points: • {the tendency / ability / potential of water (molecules) to move (out of a solution / cell) / described} (1) • {water moves from higher to lower WP / more free water, greater its value / pure water zero / always negative} (1)	concentration of free water molecules ACCEPT free water molecules are ones not associated with solute	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	An answer that includes the following points: • Valid; by removing excess {water/ solution} (before weighing) / use of electronic balance (1) • Accurate; blotting dry for same time / by suitable use of balance described (1)	not dried unless clear just the surface e.g., zeroed, calibrated, balance to suitable number of decimal places	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	• sucrose (solution) concentration	ACCEPT tissue type	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(b)(iii)	An explanation that includes the following points: • {water would {enter / leave} the potato more quickly than the yam / potato mass would {increase / decrease} more than the yam (in same time)} (1) • {because increased temperature makes (water) molecules move around more / (water) molecules have more kinetic energy} (1) • this would make (method / results) invalid (1)	ACCEPT quicker result / water enters easily / osmosis happens quicker Ignore faster reaction	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(c)(i)	A graph with the following features: • x and y-axis labelled (1) • suitable scale on y axis (1) • line of best fit for yam (1)		**(3)**

Question Number	Answer	Additional Guidance	Mark
3(c)(ii)	A calculation including the following steps. • correct gradient calculated (1) • correct reading of intercept (1) • correct equation (1)	e.g., -45 (accept -43 to -45.4) e.g., 13 (accept 12-14) e.g., y = -45x + 13 allow ecf equation	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(c)(iii)	• 0.30 (1) • -800 (kPa) (1)	Allow 0.28, 0.29 ecf for misread of first graph	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(c)(iv)	An answer that includes the following points: • solute {concentrations / potentials} free water concentration} different in cells (1)	ACCEPT named relevant solute	**(1)**