Mark Scheme (Results)

June 2022

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

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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 explanation that includes 3 of the following points: • it {carries / transports} the male {gametes / nuclei / generative nucleus} (1) • to the ovule / micropyle / ovary / ovum / female gamete (1) • to {fuse with / fertilise} {ovum / egg (cell) / female gamete / female nucleus / polar nuclei (1) • digest tissue of style (1)	Accept sperm	(3)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	An explanation that includes the following points: • the tubes grow towards the {micropyle / ovule / ovary / ovum / female gamete} (1) • {due to chemicals (released by the embryo sac) / it is chemotropic} (1)		(2)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	An answer that includes the following: • percentage germination / number germinating (1) • pollen tube length (1)		(2)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	An answer that includes the following points: • it involves {enzymes / (chemical) reactions} (1) • example of how {enzymes / (chemical) reactions} are affected by temperature (1)	e.g kinetic energy / denaturation	(2)

Question Number	Answer	Additional Guidance	Mark
1(c) (i)	An answer that includes the following points: • description of method (1) • calculation of dilution factor / use of $C_1V_1=C_2V_2$ to calculate sucrose solution volume as 2 (cm^3) (1) • stating the volume of sucrose solution and calcium ion solution to be used to make 10cm^3 (1)	ACCEPT mixed / dilute 5x / by 5/ 1:4 / 1 in 5 e. g. 2 cm^3 of sucrose solution to 8 cm^3 calcium ion solution / allow removal of 10cm^3 of bigger violume allow ecf	(3)

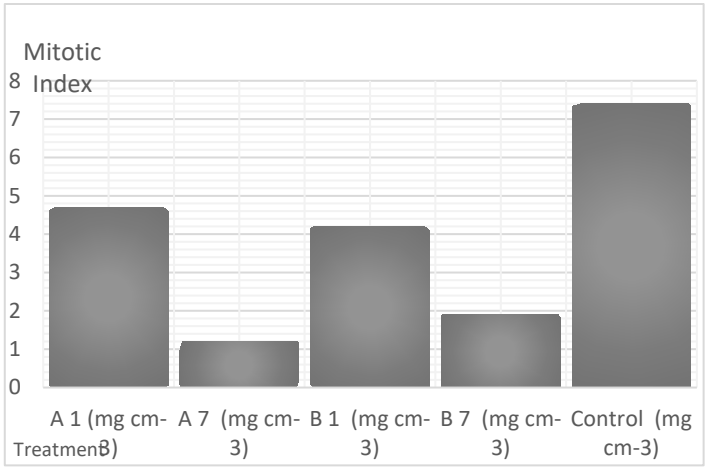
Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	• varying the (concentration of) calcium ion solution (1)	ACCEPT use of buffer (solution)	(1)

Question Number	Answer	Additional Guidance	Mark
1(d)(i)	An answer including the following: • suitable table drawn (1) • all headings correct with units (1) • all data for germination (only) and the 5 sucrose concentrations entered correctly (1)	<table><tr><th>Sucrose concentration / solution / mol dm^{-3}</th><th>Germination (%)</th></tr><tr><td>0</td><td>6</td></tr><tr><td>0.2</td><td>46</td></tr><tr><td>0.4</td><td>70</td></tr><tr><td>0.8</td><td>23</td></tr><tr><td>1.6</td><td>0</td></tr></table>Allow ± 0.5 if they choose to quote germination % to 1 dp.	(3)

Question Number	Answer	Additional Guidance	Mark
1(d)(ii)	An answer that includes the following points : • both (appear to) have optimum <u>at 0.4 mol dm^{-3}</u> (1) • (but for either) it could be anywhere between above 0.2 mol dm^{-3} and below 0.8 mol dm^{-3} (1) • values for optimum could be different (to each other) / they might not have the same optima / one optimum might not be 0.4 mol dm^{-3} (1) • more concentrations of sucrose (between 0.2 and 0.8 mol dm^{-3}) should be investigated (1)	ACCEPT 0.2 – 0.8 mol dm^{-3}	(3)

Question Number	Answer	Additional Guidance	Mark
2(a)	An answer that includes the following points : • cut root tip • (root tips) placed in (warm) acid (1) • (root tips) then placed in named stain (1) • (root tip placed on a microscope slide and) {macerated / teased / described} / squashed (1) • use of high power (on a microscope) (1) • correct ref to safety issue (1)	e.g. (acetic / ethanoic) orcein / toluidine blue /methylene blue e.g. rinsing tips in water / wearing gloves / goggles	(5)

Question Number	Answer	Additional Guidance	Mark
2(b)	An answer that includes the following steps: • correct total cell count and total dividing cell count (1) • division of dividing cell count by total cell count (and multiply by 100) (1)	NO ecf e.g.40 / 4 ACCEPT 3 ACCEPT any figure in range 35 to 46 e.g. (4 ÷ 40) = 0.10 (x 100 = 10.0 (%))	(2)

Question Number	Answer	Additional Guidance	Mark
2(c)(i)	A graph with the following features : • A axes correct (x – appropriate to their graph , y – mitotic index) and y axis with no break in the axis (1) • L axes correctly labelled with units (1) • P correct plotting on a linear scale on y (1) • S bar chart (1)	e.g.  	(4)

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)	An answer that includes the following points : • each treatment should be repeated (1) • {all conditions / named condition} should be kept constant (1) • (mean and) SD calculated / error bars (1) • look for overlap in SDs / perform t-test (1)	IGNORE standard conditions ALLOW range bars as ecf	(4)

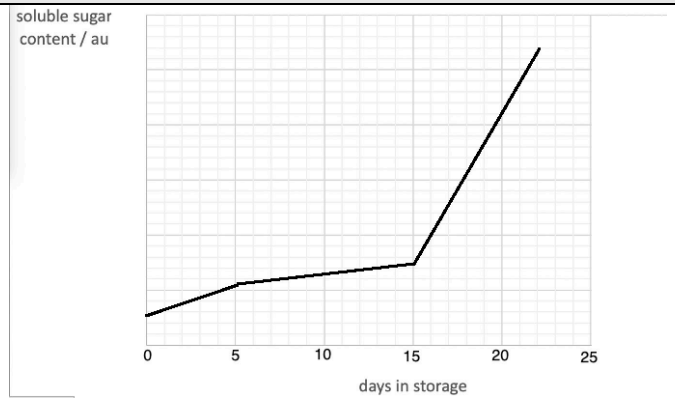
Question Number	Answer	Additional Guidance	Mark
3(a)	An answer that includes the following points : • serial dilution of stock solution / described (1) • describe method to measure out same volume of each dilution (into test tube) (1) • add same {volume / no. of drops} (of same concentration) iodine (solution to each test tube) (1) • description of method for observing colour of solution (1) • {observe / note down} the colour of the resultant solution (1)	e.g. putting solution in a test tube of the same diameter	(4)

Question Number	Answer	Additional Guidance	Mark
3(b)	An answer that includes the following points: • Russet **and** King Edward show {high(er) level of starch / black and dark blue} **and** therefore best for baking (1) • Nicola **and** Purple Congo show {low(er) level of starch / pale blue } **and** therefore best for boiling (1) • King Edward better than Russet for baking / Nicola better than Purple Congo for boiling / King Edward best for baking, Nicola best for boiling(1) • therefore the suggestions are supported by the data (1) • a comment on the subjectivity of the colour differences (1)	e.g. the results are semi-quantitative	(4)

Question Number	Answer	Additional Guidance	Mark
3(c)	An answer including the following points : • suitable method chosen (1) • further detail (1)	e.g colorimeter, looking down on test tubes and adjusting heights e.g. colorimeter, zeroing, use of same cuvette, measure absorbance or transmission looking down tubes, judging colour intensity by looking down and measure heights.	(2)

Question Number	Answer	Additional Guidance	Mark
3(d)(i)	An answer including the following steps : • correct reading at day 23 minus correct reading at day 15 and correct subtraction(1) • division of answer by time (8 days) (1)	e.g. 14-5 = 9 or 5-14 = -9 e.g. 9 ÷ 8 = 1.125 au day^{-1} ACCEPT au / day, au per day ACCEPT 1.1, 1.13 IGNORE the sign	(2)

Question Number	Answer	Additional Guidance	Mark
3(d)(ii)	An answer including the following points : • negative correlation / falls throughout / non-linear (1) • falls {very little / slowly / by 2 au} {between / up to} days 0 and {5 / 15} • falls {a lot /rapidly / by 9} {between / up to} days 15 and 23 (1)		(2)

Question Number	Answer	Additional Guidance	Mark
3(d)(iii)	A graph that shows the following features: • overall rise (1) • an inflection at 15 and then steeper than anywhere else on their graph (1)		(2)

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