Mark Scheme (Results)

October 2023

Pearson Edexcel International Advanced Level
In Biology (WBI13) Paper 01
Unit 3: 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
1ai	An answer that includes the following points • (using a light microscope find cell) under low power (1) • then view under high power (1) • calibrate eyepiece graticule / use of stage micrometer • count number of (eyepiece) graticule units over the cell (1) • convert eyepiece graticule units (to microns using calibration) (1) • measure diameter at different positions / orientations (1)	IGNORE electron microscope	expert 5

Question Number	Answer	Additional Guidance	Mark
1aii	A drawing with the following features • drawing using continuous lines showing correct shape of cell (1) • nucleus drawn with continuous lines in correct position and correct size (1) • any two correct labels (1) • suitable scale line shown (1)	Lose this mark if draw cell wall membrane / cytoplasm / nucleus / mitochondria IGNORE cell wall, wrong labels as long as 2 are correct could be a scale line with suitable measurement / magnification (about 1000 if a 6 cm drawing, others pro-rata)	4

Question Number	Answer	Additional Guidance	Mark
1aiii	A calculation which includes the following steps • conversion of onion cell length to micrometres / cheek cell to mm (1) • division of onion cell length by diameter of human cell and answer quoted as a ratio (1)	= 200 (μm) OR 0.06 mm = 200 ÷ 60 OR 0.2 ÷ 0.06 3.33 : 1 ACCEPT 3.3, 3.33 ACCEPT 1:0.3 NOT 1:3.33, this gets 1 mark	2

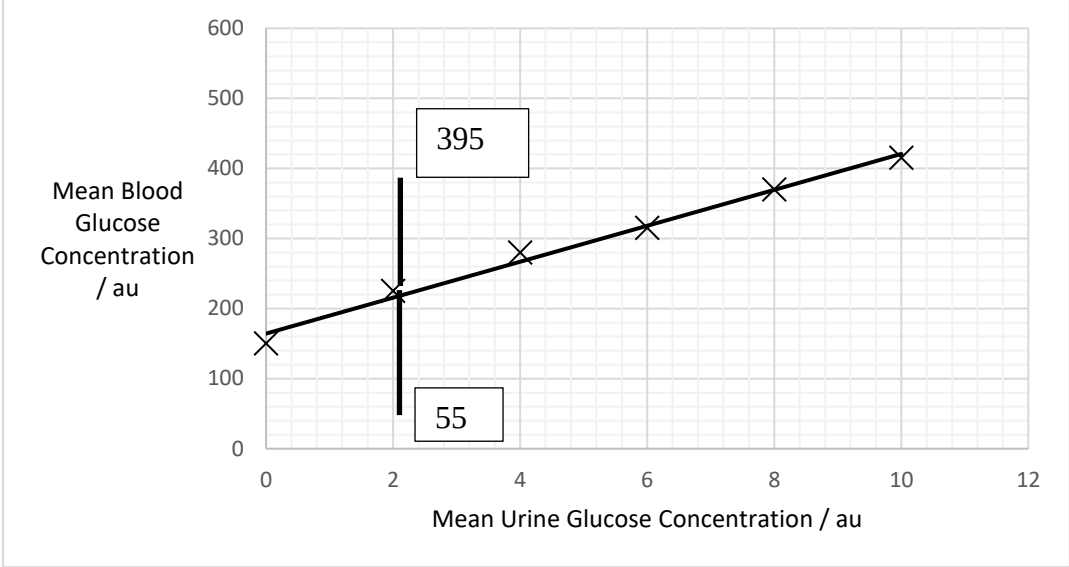
Question Number	Answer	Additional Guidance	Mark
1bi	The following correctly named: • X- Sclerenchyma, Y- Phloem / Sieve (tube element), Z- Xylem (cell / vessel) (2) All three for 2 marks 1 or 2 for one mark.		2

Question Number	Answer	Additional Guidance	Mark
1bii	• {phloem / sieve} cell / correct letter from 1bi	consider ecf from bi	1

Question Number	Answer	Additional Guidance	Mark
2ai	An answer that includes the following points • addition of (Benedict's / Fehling's) solution (1) • heat / place in water bath (and observe colour change) (1)	Water bath must be heated or > 50 C	2

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2aii</td><td></td><td>e.g.
<table>
<tr><th>Appearance</th><th>Glucose concentration / g dm^{-3}</th><th>Glucose quantity</th></tr>
<tr><td>Blue</td><td>0.0</td><td>None</td></tr>
<tr><td>Green</td><td>0.1 to 0.4</td><td>Trace</td></tr>
<tr><td>Green with precipitate</td><td>0.5 to 10.0</td><td>Very low</td></tr>
<tr><td>Yellow with precipitate</td><td>10.1 to 15.0</td><td>Low</td></tr>
<tr><td>Orange with precipitate</td><td>15.1 to 20.0</td><td>Moderate</td></tr>
<tr><td>Red with precipitate</td><td>>20.0</td><td>High</td></tr>
</table></td><td>2</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
2bi	An answer that includes the following points: • describe how mean obtained (1) • describe how standard deviation obtained (1)	e.g substitute mean and number of observations into equation.	2

Question Number	Answer	Additional Guidance	Mark
2bii	A graph with the following features • L1 x label mean urine glucose concentration / au (1) • L2 y- mean blood glucose concentration / au) (1) • P1 plots correct on a linear scale on both axes (1) • P2 standard deviation plotted correctly (1) • suitable line of best fit drawn (1)	 IGNORE extrapolation	5

Question Number	Answer	Additional Guidance	Mark
2biii	An answer that includes the following points: • there is a correlation between the 2 variables / variables may depend on each other / as urine glucose goes up blood glucose goes up (1) • however, the {SDs / error bars} overlap (1) • suggesting that differences not significant)(1)	NOT vice versa to the last alternative NOT range bars	3

Question Number	Answer	Additional Guidance	Mark
2biv	An calculation that includes the following steps : • substitution of values into equation (1) • solving of equation (1) • correct rounding (1)	e.g. y = 29.3 x 12 +154.1 = 505.7 rounded to 506 allow ecf for 12 = 29.3 x X +154.1 = - 4.849 (ignore sign) Rounded to 4.85	3

Question Number	Answer	Additional Guidance	Mark
3ai	An answer with the following : • metaphase and anaphase		1

Question Number	Answer	Additional Guidance	Mark
3aii	An answer which includes the following points: Similarities • cytokinesis (occurs) (1) • two (genetically) identical cells formed (1) Differences • cell plate formed in plants and not in animals / animal cell contracts but plant cell forms {vesicles / wall} in middle / plants cells remain connected by {plasmodesmata / pits}, none in animal cells. (1)	accept description, if implied under differences	3

Question Number	Answer	Additional Guidance	Mark
3bi	• lectin {treatment / added) / lectin concentration (1)		1

Question Number	Answer	Additional Guidance	Mark
3bii	An answer that includes the following points : • correct ref to safety issue (1) and 4 of the following: • grow roots of one group in lectin, the other in water (1) • obtain root tip (1) • (root tips) placed in {(warm) acid / macerated / teased / described} (1 (1) • (root tips) then placed in appropriate named stain (1) • (root tip) squashed (1) • cells dividing and {not dividing / interphase / total} counted under microscope (1)	e.g. rinsing tips in water wearing gloves / goggles e.g. (acetic / ethanoic) orcein / toluidine blue /methylene blue	5

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3biii</td><td>A table with the following features :

• suitable table drawn (1)

• all headings correct (1)

• all data correctly entered (1)</td><td><table><tr><th></th><th>number of cells in Interphase</th><th>number of cells in a stage of Mitosis</th></tr><tr><td>Control</td><td>148</td><td>24</td></tr><tr><td>Treated with lectin</td><td>160</td><td>88</td></tr></table>table must have 2 rows and 2 columns minimum
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Extras lose mp 3</td><td>.

3</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3biv</td><td>A calculation that includes the following steps :

• determine total number of cells in mitosis in lectin treatment and total number of cells observed (1)

• calculate percentage (1)</td><td>e.g.

88 and 160+88=248

(88/248) x 100 = 35.5 / 36</td><td>

2</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
3bv	An answer that includes the following points : • percentage in mitosis is greater with lectins than without (1) • but we have no idea of variability / difference may not be significant / no SDs (1)	IGNORE number of cells	2

Question Number	Answer	Additional Guidance	Mark
3bvi	An answer that includes the following points : • use of Chi (squared test) (1) • because need to test {the significance of the difference between observed and expected results / association / frequency data} (1)	Allow ecf for t-test	2

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