Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced Subsidiary Level in Biology

WBI13/01

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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. • temperature (1) • light intensity (1) • pH (1)	accept CO_2, humidity	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	An answer that includes two of the following. • nitr**ate** (1) • sulf**ate** (1) • magnesium (1) • calcium (1) • phosph**ate** (1) • potassium (1)	Allow chemical symbols if correct NO_3^- SO_4^{2-} Mg^{2+} Ca^{2+} PO_4^{3-} K^+	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	• medium (for growth) and (organic) fertiliser	medium can be described as long as both e.g. hydroponic vs soil	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	A graph with the following features: • axes correct orientation (x, category, i.e. B and D or number of leaves **and** root length y, number of leaves **and** root length (1) • y (axes / axis) appropriately labelled (mean number of leaves AND **mean** root length / cm) (1) • a key provided / bars individually labelled / bars or plots identifiable (1) • correct plotting on a linear scale on y starting at zero with no discontinuity (1)	accept fully labelled key or bars for mp 2 and 3 plot of leaves against roots can have mp 2,3 and 4	**(4)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	An answer that includes three of the following points. • the suggestion is correct (1) • significant for leaf number in hydroponic / not significant for leaf number in soil (1) • not significant in **both** hydroponic or soil for root length (1) • a **relevant and correct** reference to overlap or no overlap	must be clear statement accept described e.g. (organic) fertiliser leads to an increase in (mean) leaf number and root length in both if they go through them for mps 2 and 3 look for comparisons between A (h-f) and B (h+f) and/or C (s-f) and D (s+f) ignore comparisons between A and C & B and D so A (h-f) vs B(h+f) is significant for leaves C (s-f) vs D (s+f) which is not significant for leaves so A (h-f) vs B(h+f) not sig. also C (s-f) vs D (s+f) not sig accept the only significant difference is in leaf number in hydroponic for 2 marks	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(b)(iii)	A calculation with the following steps: • selection of correct figures and difference calculated (1) • correct calculation (1)	no ecf e.g. 1.5 and 1.3, 1.5-1.3 = 0.2 e.g. (0.2 ÷ 1.5) x 100 = -13.3 %. accept 13.3 % 15.4%. accept -15.4% for 1 mark	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(a)	An description that includes three of the following points: • the molecule is {fibrous / a straight chain} (1) • made of polypeptide(s) (1) • formed into alpha {helices / helix} (1) • three alpha helices / a triple helix (1) • (polypeptides held together by) H bonds (1) • every 3rd amino acid is glycine (1)	accept is a fibre accept alpha helix accept (rich in) proline or hydroxyproline	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(b)	A description that includes the following points: • use of biuret (1) • {purple / violet / mauve} solution produced (1) • compare this with colour {standards / chart} (1)	accept a description ignore colorimeter	**(3)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr>
<td>2(c)(i)</td>
<td>A table with the following features:

• suitable table drawn (1)

• all headings correct with units (1)

• all mean data correctly entered (1)

• all SDs correctly entered (1)</td>
<td>
<table>
<tr><th>pH</th><th>Mean collagen breakdown / au</th><th>{SD / range / SE}</th></tr>
<tr><td>6.50</td><td>34</td><td>2.5</td></tr>
<tr><td>7.00</td><td>42</td><td>3.5</td></tr>
<tr><td>7.50</td><td>15</td><td>2.0</td></tr>
<tr><td>8.00</td><td>14</td><td>5.0</td></tr>
<tr><td>8.50</td><td>12</td><td>4.0</td></tr>
</table>
accept pH to one dp, look for consistency in columns dp for all data
accept mean and SD in same column with ± which can be before the no. or after
Allow columns in any order
</td>
<td>(4)</td>
</tr>
</table>

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)	An answer that includes the following points: • At pH 7 mean breakdown is highest (1) • {SDs do not overlap between 7 and 6.5 & 7.5 / the difference between (breakdown) between 7 and 6.5 & 7.5 is significant} (1) • optimum could be anywhere between 6.5 and 7.5(1) • {the SDs of 7.5, 8.0 and 8.5 overlap / difference seen between 7.5, 8.0 and 8.5 are not significant} (1)	accept error bars / range bars / SEs for SD accept 6.5 to 7.5 no data in range 6.5 to 7.5 accept difference between 7.5 and 8.5	**(4)**

Total for Question 2 = 14

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	A description that includes three of the following points. • flaming of {loop / wire / spreader / tweezers / neck of broth culture bottle} (1) • have (lit) Bunsen by workplace (1) • lift Petri dish lid only partially (1) • disinfect workbench / surface (1)	accept autoclave petri dishes, medium, use sterile petri dishes ignore tape in a cross accept sterilise / sanitise accept area	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	An explanation that includes the following points. • allow methanol to evaporate before placing disc (1) • so that any antimicrobial effect of methanol is removed (1) OR • set up a control disc **with** methanol only (1) • so that the antimicrobial effect of methanol {can be measured / seen} (1)	accept compare with extracts	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(a)(iii)	An answer that includes the following points: • (same sized filter paper) so that same volume of {extract / methanol / antimicrobial chemical} applied in each case (1) • (incubate at 37 C) so that it {allows growth of / provides **optimum** temperature for} (pathogenic) bacteria (1) • (incubate for 24 hours) so that {lawn to develop / antimicrobial effect to happen} (1)	accept quantity, mass, size ignore amount, surface area accept enzymes if **of bacteria** accept (time to) (re)act / to grow **enough / to be seen**	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	A calculation which includes the following steps: • area of whole central region (1) • rounded correctly (1)	e.g. $(14.3 \div 2)^2 \times 3.14 = 160.61$ 161	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	A description that includes the following points. • measure diameter using callipers (1) • measure more than one diameter (1) • {repeat / calculate mean} (1)	accept average	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(iii)	A description that includes four of the following points: 1. both the extracts and the antibiotics show an antimicrobial **effect** (1) 2. tetracycline is most effective / penicillin least **effective** (1) 3. frankincense and myrrh (very) similar **effect** (1) 4. frankincense most **effective** extract (1) 5. some data quoted or correctly manipulated to support mp 2, 3 or 4 (1) 6. there are no measures of variability so cannot comment on validity of the conclusions (1)	allow mention of size of Z of I once only as alternative to effect must be a clear statement, not pieced together accept all have effect accept tetracycline highest, best, most effective etc. eg tetracycline is 1.5 times better than next best on diameter, over 7 times better on area basis. allow an “almost double” type of answer	**(4)**

Question Number	Answer	Additional Guidance	Mark
3(b)(iv)	An explanation that includes the following points : • higher temperatures {will cause molecules to diffuse faster / give molecules more (kinetic) energy} (1) • smaller size molecules will diffuse faster than larger molecules (1) • higher concentrations of extract {will have a faster rate of diffusion (than lower concentrations) / will cause a steeper diffusion gradient} (1) • more soluble molecules will diffuse faster than less soluble (1)	accept reverse argument in every case Ignore reference to enzymes, collisions, denaturing membranes accept gel density	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(c)(i)	32 (μg dm^{-3})	accept 8 or 16 (μg dm^{-3})	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(c)(ii)	An answer that includes the following points: • have more values of extract concentration (1) • between {16 μg dm^{-3} and below 32 μg dm^{-3} / of smaller intervals} (1)	 can be implied ignore repeat, colorimeter accept between any two stated values	 **(2)**

Total for Question 3 = 22