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Mark Scheme (Results)

January 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)	• {diameter / area} of zone of inhibition/ number of colonies (on agar) / degree of turbidity / transmission/ absorbance / number of cells (1) • mm / mm^2/ number (cells) per cm^3 / % (transmission) / au (absorbance) (1)	**Accept** width **Accept** suitable alternative units (e.g. cm^3)	**2**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	An answer that includes the following points: • description of how bacteria are cultured (1) • description of how extracts are added to culture (1) • control of feature of independent variable described (1) • incubate at suitable temperature for suitable time (1) • appropriate measurement of DV (1) • ref to relevant safety measure (1)	lawn /pour plate / broth e.g. put filter paper discs soaked on culture / cut wells e.g disc size /extract volume / solvent volume temp. <37, time 1 day to 7 days e.g. disinfect equipment, flame equipment, lift lid partially, autoclaving after, goggles, gloves, tie back long hair	**5**

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	An answer that includes the following steps: • correct reading of figures from graph (1) • calculation of percentage change (1)	 29, 14 52 (%) OR 110 (%)	 **2**

Question Number	Answer	Additional Guidance	Mark
1(a)(iv)	An answer that includes the following points: • All the extracts have an effect on all of the bacteria (1) • methanol extract has greatest effect (on all bacteria) (1) • both extracts are more effective than gentamycin (in all four bacteria) / acetone extract less effective than methanol extract (1) • greatest effect is on {*S aureus* / *S typhimurium*} / least effect is on *P. aeruginosa* / (1)		**(4)**

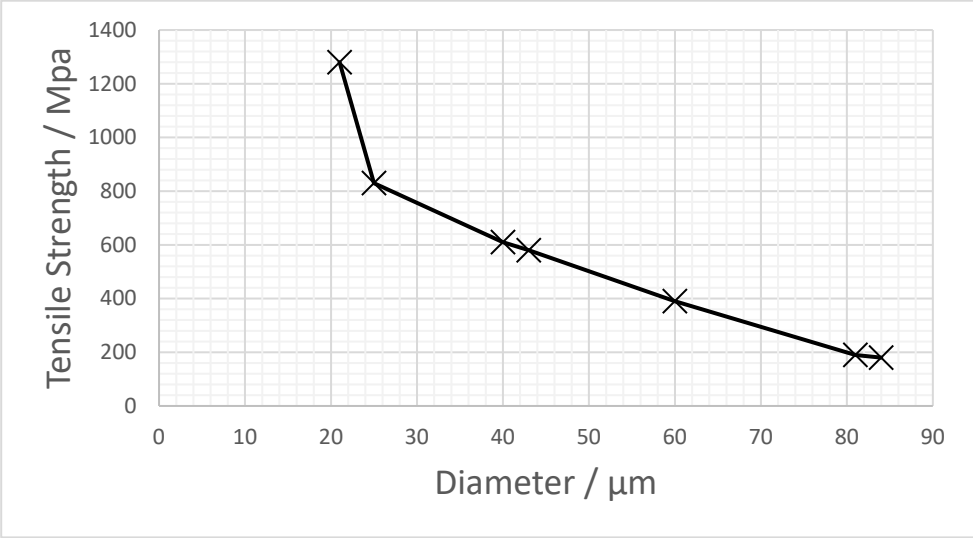
Question Number	Answer	Additional Guidance	Mark
1(b)	An answer including the following points : • {all 3 / both} inhibit bacterial growth in all (4) bacteria (1) • methanol extract more effective than both chemicals (1) • (in each case) the effect of the methanol extract is more than the sum of the effect of the two chemicals (1) • there may be other anti-microbial chemicals in the methanol extract / the two chemicals work together to produce an effects greater than their sum (synergy) (1)		**(4)**

Question Number	Answer	Additional Guidance	Mark
1(c)	An answer including three of the following: Placebos • it is used as a control / more validity (1) • to {eliminate} / account for} a psychological effect (of taking the drug) (1) Double-blind trials • so that {doctor / scientist} does not know if the treatment contains the (new) drug or not (1) • to remove bias from results (1)	e.g. comparison with the actual drug **Accept** to {eliminate} / account for} a psychological effect (of administering the drug)	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	An answer that includes the following steps: • reading of diameter using scale (1) • width calculated (1)	Example of calculation: 19 units So actual width is 19 x 3 = 57 (µm) correct answer with no working gains both marks Accept diameters from 15 to 20 units	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	An answer that includes the following points : • xylem (1) • sclerenchyma (1)	Mark first answer on each line	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	• fibre variables taken into account (1) • appropriate environmental variable controlled (1) • appropriate description of how masses are added (1) • adding masses until fibre breaks / measure the mass that {breaks the fibre / that the fibre can hold before breaking} (1)	e.g. length, age, mass, hydration level, plant extracted from e.g. temperature, humidity, distance between stands e.g. one at a time, gently	**(4)**

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	A graph showing the following features: A axes correct (x – diameter, y – tensile strength) (1) L axes correctly labelled and with units (1) P correct plotting on a linear scale on y (1) S points joined with straight lines. (1)		**(4)**

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	An answer including three of the following points : • the larger the diameter the less tensile strength / negative correlation (1) • non-linear (1) • steepest decrease {between 21 μm and 25 μm / up to 25 μm} (1) • less steep from {25–81 μm / 81-84 μm } (1)	**Accept** reverse	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	• all cylinders same {length / diameter / size} / temperature kept constant (1)	**Accept** same volume **and** surface area	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	• repeat measurements {and obtain mean / SD / identify anomalies} for each concentration / use callipers to measure length changes / description of use of ruler to avoid parallax errors (1)	Candidates are going to express their answers in many different ways	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	An answer including the following points: • the liquids should be mixed in ratio 2:3 (1) • The 3 is water (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	An answer including the following points: • it {dissolves (completely in water) / is soluble} (1) • it is {not broken down / not metabolically active / inert} (1) • it {is not taken up by the carrot / does not cross membrane of cells / has osmotic effect} (1)		**(2)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(c)(i)</td><td>A table drawn with the following features:

• suitable table drawn (1)

• headings with units (1)

• all data correctly entered (1)</td><td><table>
<tr><th>concentration (of sucrose solution) / mol dm^{-3}</th><th>change in length at 50 min / mm</th></tr>
<tr><td>0.0</td><td>4.0</td></tr>
<tr><td>0.2</td><td>1.6</td></tr>
<tr><td>0.4</td><td>-1.4</td></tr>
<tr><td>0.6</td><td>-3.4</td></tr>
<tr><td>0.8</td><td>-4.6</td></tr>
<tr><td>1.0</td><td>-5.2</td></tr>
</table></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>3(c)(ii)</td><td>An answer including the following steps :

• reading values from a tangent (1)

• correct answer (in mm min^{-1}) (1)</td><td>e.g. -3.6 at 10.0 to -4.8 at 20.0,
diff is 1.2
1.2 ÷ 10 = -0.12 (mm min^{-1})</td><td>(2)</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
3(c)(iii)	An answer including the following points : • the cylinder stops decreasing in length (1) • because all the water (that can be lost) has been lost / water potential inside = water potential outside (1)	Candidates will express mark point 2 in a number of ways	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(c)(iv)	An answer including the following points • the cylinder stops increasing in length (1) • as the cells are fully turgid / water potential inside = water potential outside (1)	Candidates will express mark point 2 in a number of ways	**(2)**

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