GradeMax



Mark Scheme (Results)

October 2019

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

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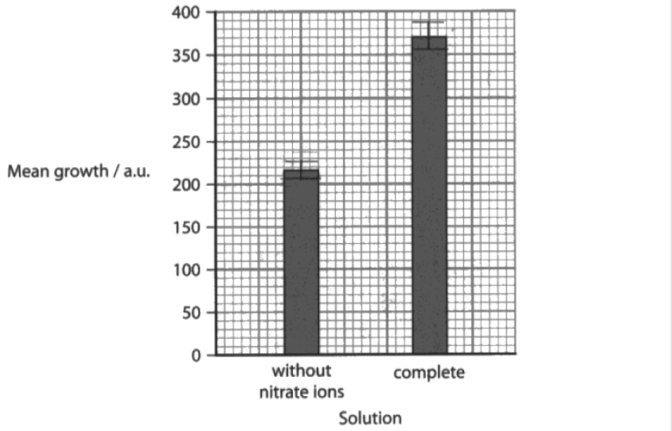
General Marking Guidance

- 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 answer that includes the following points: • nitrate / sulfate / ammonium (1) • magnesium / nitrate (1) • calcium (1)	DO NOT ACCEPT formulae / ammonia DO NOT ACCEPT more than one if one is incorrect	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	An answer that includes four of the following points: • control of {species / type / age} of plant (1) • control of temperature / soil pH /light intensity / time of growth (1) • complete solution described and solution without named ion (1) • measurement of dependent variable described (1) • replication to measure variability / find SD (1)	ACCEPT if named ion in a list of correct ions Eg height / mass / number / size of leaves	**(4)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	An answer showing the following steps: • difference in {means} calculated / both mean rates calculated (1) • rate calculated with appropriate units (1)	Correct answer with no working shown gains 2 marks e.g. 371 – 216 or 155 OR 371 ÷ 21 AND 216 ÷ 21 e.g. ÷ 21 = 7.38 / 7.4 a.u. 17.67 – 10.29 = 7.38 / 7.4 au	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	An answer that includes the following: • SDs added correctly to both bars (1) • the SDs do not overlap which shows that the difference (between the means) is significant (1) • the results for the complete solution are {more variable / less reliable} (1)	 DO NOT ACCEPT the results are significant ACCEPT range bars / error bars ACCEPT converse	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	An answer that includes the following three points. • 2, to {stain / dye / colour} the chromosomes (1) • 4, to spread / separate the cells out (1) • 5, to locate **and then** magnify (the cells) (1)	ACCEPT to make Chromosomes visible on its own DO NOT ACCEPT stain etc cells ACCEPT so cells do not overlap ACCEPT HP to see detail	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	An explanation that includes the following points: • safety precaution identified (1) • safety precaution explained (1)	e.g. rinsing tips in water / wearing gloves / goggles because hydrochloric acid, acetic orcein is corrosive / irritant allergy to orcein	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(b)	An answer that includes five of the following points: • use range of pH solutions (1) • (in which plants) grown (1) • (several) root tips (from each pH) (1) • take cells from same part of root tips (1) • count number of cells undergoing mitosis and total number of cells (1) • in several fields of view (1)	ACCEPT range of buffers	**(5)**

Question Number	Answer	Additional Guidance	Mark
2(c)(i)	A table showing the following features: • headings of pH and mitotic index (with units, %) (1) • pH data correctly entered into table (1) • mitotic index data correctly entered (1)	<table><tr><td>pH</td><td>Mitotic index (%)</td></tr><tr><td>3.5</td><td>2</td></tr><tr><td>4.3</td><td>3.4</td></tr><tr><td>5.1</td><td>7.2</td></tr><tr><td>6.2</td><td>9.6</td></tr><tr><td>7.2</td><td>8.2</td></tr><tr><td>8.4</td><td>7.6</td></tr><tr><td>9</td><td>3.8</td></tr></table> allow + or – 0.1	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)	An answer showing the following steps: • number of cells in mitosis identified (1) • mitotic index calculated (1) • corresponding pH value read from the graph (1)	Correct answer with no working shown gains two marks 3 e.g. MI = (3 ÷ 35) x 100 = 8.57 / 8.6 % (1) 5.7 AND/OR 6.9 (ACCEPT +/- 0.05) ACCEPT correct reading from graph of any answer to mp 2	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(c)(iii)	An explanation that includes four of the following points: • enzymes involved (1) • (enzymes are) protein (1) • 6.2 is the optimum pH (for these enzymes) (1) • at pH {below optimum / above optimum} the active site is not the right shape / enzyme denatures / bonds holding shape change (1) • enzyme substrate complexes do not form (1)		**(4)**

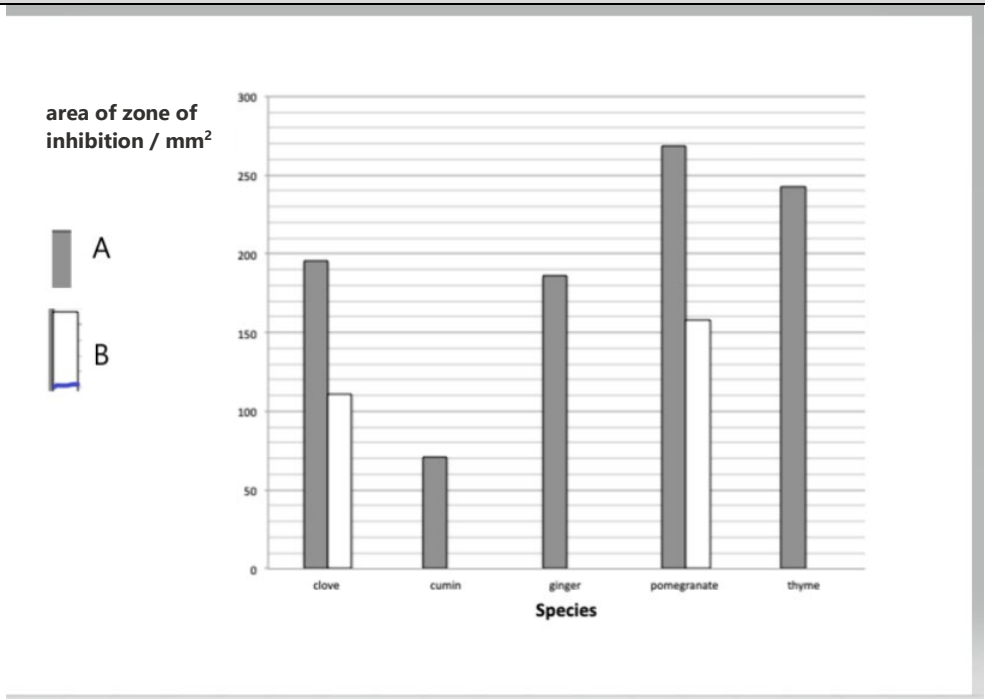
Question Number	Answer	Additional Guidance	Mark
3(a)(i)	• area of zone {with no bacteria / of inhibition}		**(1)**

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	• to allow (chemicals in the extract) to diffuse into agar / to stop growth of bacteria (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
3(a)(iii)	An description that includes the following points: • measure {diameter / radius} of zone (1) • apply area = πr^2 (1) OR • place dish on {gridded / graph} paper (1) • count squares (1)	ACCEPT $\pi(d/2)^2$ ACCEPT r = d ÷ 2 ACCEPT cut out and weigh	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(a)(iv)	An answer that includes the following points: • filter paper discs qualified (1) • (soaked in) {solvent / water} (1)	e.g. size, paper type, thickness, same as ones used	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	An answer showing the following steps: • difference calculated (1) • percentage calculated (1)	Correct answer with no working shown gains two marks • 196-111 or 85 (1) • 85 ÷ 111 = 76.57 / 76.6 / 85 ÷ 196 = 43.4 / 43.37 (1)	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	A graph showing the following features: • A bar chart (1) • L axes correctly labelled, and with units (mm^2) (1) • P correct plotting (1) • K key or labels to show type A and type B bacteria results (1) • S suitable linear scale for area starting at zero with no interruption (1)		(5)

Question Number	Answer	Additional Guidance	Mark
3(b)(iii)	An answer that includes three of the following points: • cumin is the least effective extract to use (1) • pomegranate is the most effective extract to use (1) • cumin, thyme, and ginger cannot be used to preserve food against type B (1) • type B is more difficult to control (1)	ACCEPT against Type A ACCEPT pomegranate and clove can be used against B ACCEPT converse / A inhibited by all	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(c)	An answer that includes two of the following points: • {solubility / concentration / volume} of extract / solvent used (1) • size of molecules in the extract (1) • rate of diffusion of extract into agar (1)	ACCEPT antimicrobial	**(2)**

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