

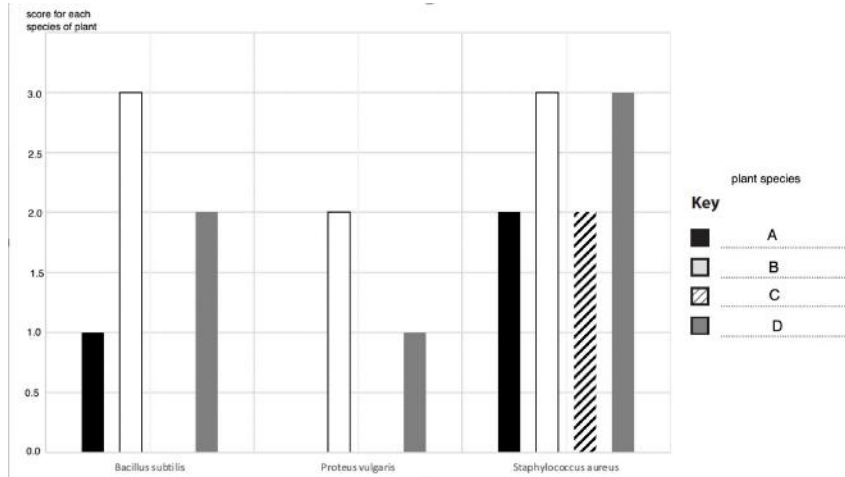


Mark Scheme (Results)

Summer 2021

Pearson Edexcel International Advanced Level
In Biology (WB13) Paper 01
Practical Skills in Biology I

Question Number	Answer	Additional Guidance	Mark
1a	An answer that includes five of the following points. • description of {bacteria grown (on nutrient agar) / bacterial lawn} / bacterial broth (1) • filter paper discs soaked in plant extract (placed on agar) / plant extract placed in well (cut in agar) / plant extract added to broth (1) • control variable described (1) • one safety aspect described (1) • incubate for suitable time (1) • clear zone around {disc / well} {measured / scored / turbidity measured (1)}	Accept microbe e.g. disc size / extract volume / temperature e.g. flaming / dish lid / use autoclave / safe temperature quoted (<32 C) Accept 24 hours to 1 week Accept cloudiness	(5)

Question Number	Answer	Additional Guidance	Mark																				
1(b)(i)	A chart with the following features. • Y-axis correctly completed (1) • X-axis correctly completed (1) • key correctly completed (1)	correct linear scale and title bacteria names A,B,C,D and title  <table><caption>score for each species of plant</caption><thead><tr><th>plant species</th><th>A</th><th>B</th><th>C</th><th>D</th></tr></thead><tbody><tr><td>Bacillus subtilis</td><td>1.0</td><td>3.0</td><td></td><td>2.0</td></tr><tr><td>Proteus vulgaris</td><td></td><td>2.0</td><td></td><td>1.0</td></tr><tr><td>Staphylococcus aureus</td><td>2.0</td><td>3.0</td><td>2.0</td><td>3.0</td></tr></tbody></table>	plant species	A	B	C	D	Bacillus subtilis	1.0	3.0		2.0	Proteus vulgaris		2.0		1.0	Staphylococcus aureus	2.0	3.0	2.0	3.0	
plant species	A	B	C	D																			
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(3)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	An answer that includes the following points: • plant C has the lowest (antimicrobial) effect / affects only one bacterial species (1) • plant B has the highest (antimicrobial) effect (1) • {B / D} affect all 3 species (1) • data manipulated to support one of the first two marking points (1)	e.g. B has a total score of 8 / C has a total score of 2	(4)

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	An answer that includes the following three points. • the water content is reduced (1) • the seeds are x-rayed (1) • the seeds are kept at {low temperature / dry} (1)	Accept seeds dried Accept low oxygen environment	(3)

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	An answer that includes the following points. - the {number of different / variety of} species (of living organisms) in an area / stated area (1) - the genetic differences within species of living organisms (1)	Accept species richness of an area Accept genetic variety	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	A description that includes 4 of the following points: - fixing root tip described (1) - stain used (1) - description of maceration / squashing (1) - view through high power microscope (1) - count of number of dividing cells and divide by total number of cells (1)	e.g. heating with conc. HCl Accept magnification quoted $\geq 100\times$	(4)

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	An answer that includes the following points. • read MI from graph (1) • rearrange equation $MI = \text{no. of cells in mitosis} \div \text{total number of cells}$ to calculate total number of cells (1) • substitute values in this equation and correct answer (1)	e.g. 5(%) total number of cells = no. of cells in mitosis $\div$ MI total no. of cells = $14 \div 0.05 = 280$ / T = $1400 \div 5 = 280$ correct answer with no working gains 3 accept T = 14 / 5 for 2	(3)

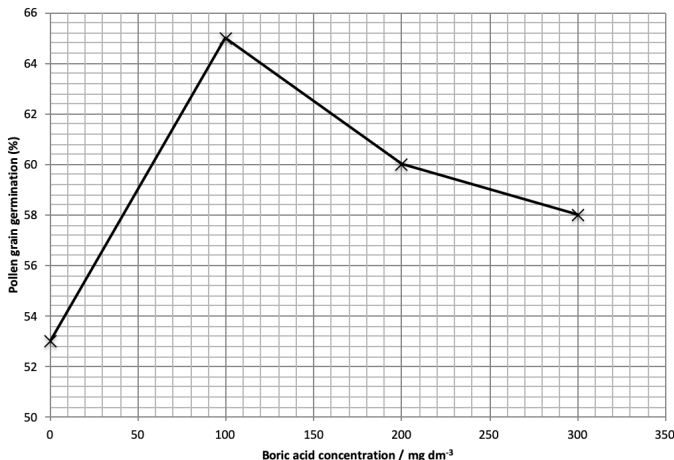
Question Number	Answer	Additional Guidance	Mark												
2(b)(iii)	A table drawn showing: • suitable table (drawn) (1) • headings root length with units, mitotic index with units (1) • data correctly entered (1)	2 columns and 6 rows or vice versa units in cells negates this mark <table><tr><th>Root Length / mm</th><th>Mitotic Index (%)</th></tr><tr><td>5(.0)</td><td>0.0</td></tr><tr><td>6(.0)</td><td>0.4</td></tr><tr><td>8(.0)</td><td>0.8</td></tr><tr><td>10(.0)</td><td>1.4</td></tr><tr><td>12(.0)</td><td>1.8</td></tr></table>	Root Length / mm	Mitotic Index (%)	5(.0)	0.0	6(.0)	0.4	8(.0)	0.8	10(.0)	1.4	12(.0)	1.8	(3)
Root Length / mm	Mitotic Index (%)														
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Question Number	Answer	Additional Guidance	Mark
2(b)(iv)	A description which includes the following points: - the {treated / aged} seeds have a lower mitotic index than the untreated seeds (1) - the longer the treatment the more the mitotic index is reduced / 14 days more than 4 days (1) {optimum / maximum} mitosis occurs in longer roots with greater aging (1)	Accept mitosis starts later in more aged roots	(3)

Question Number	Answer	Additional Guidance	Mark
2(b)(v)	A description which includes the following points: - experiment repeated (1) - under the same conditions / described (1)		(2)

Question Number	Answer	Additional Guidance	Mark
3a	number of grains germinated (1)	Accept percentage germination (of pollen grains)	(1)

Question Number	Answer	Additional Guidance	Mark
3b	An explanation that includes the following points: - because it might affect {(pollen grain) germination / enzymes (involved in germination)} (1) - it is (thought to be) the optimum for {(pollen grain) germination / enzymes (involved in pollen germination)} (1)		(2)

Question Number	Answer	Additional Guidance	Mark
3ci	A graph with the following features: • A axes correctly orientated (1) • L1 axes correctly labelled (1) • L2 axes with correct units (1) • P correct plotting on a suitable linear scale for both axes (1) • R points joined with ruled straight lines (1)	 max 4 for bar chart as loses mp R	(5)

Question Number	Answer	Additional Guidance	Mark
3cii	A description that includes the following points: • (all concentrations of) boric acid enhance germination (1) • germination is higher in 100 mg dm⁻³ than all other concentrations / germination shows optimum value at 100 mg dm⁻³ (1)	Accept optimum between 0 and 200 Allow consequential error	(2)

Question Number	Answer	Additional Guidance	Mark
3di	A calculation that includes: • calculation of increase in rate • calculation of percentage increase in rate (1)	Accept values from 211 to 214 for 0 at 2 hrs e.g. rate at 0 is $212 \div 2 = 106$ difference = $\{130.5 - 106 / 24.5\}$ $(24.5 \div 106) \times 100 = 23$ (%) ignore decimal places $130.5 - 106 \div 130.5 = 18.8$ gets 1 alternatives 1. rate at 0 is $211 \div 2 = 105.5$ = $\{130.5 - 105.5 / 25\}$ $(25 \div 105.5) \times 100 = 23$ (%) ignore decimal places 2. rate at 0 is $213 \div 2 = 106.5$ = $\{130.5 - 106.5 / 24\}$ $(24 \div 106.5) \times 100 = 22$ (%) ignore decimal places 3. rate at 0 is $214 \div 2 = 107$ = $\{130.5 - 107 / 23.5\}$ $(23.5 \div 107) \times 100 = 22$ (%) ignore decimal places $130.5 - 106 \div 130.5 = 18.8$ gets 1 $130.5 - 105.5 \div 130.5 = 19.2$ gets 1 $130.5 - 106.5 \div 130.5 = 18.3$ gets 1 $130.5 - 107 \div 130.5 = 18$ gets 1 Correct answer with no working gains 2 marks (2)	(2)

Question Number	Answer	Additional Guidance	Mark
3dii	An answer that includes five of the following points: • make (100, 200, 300 mg dm⁻³) boric acid solutions from 500 mg dm⁻³ solution by dilution (1) • control variable identified (1) • view through high power of microscope (1) • suitable method for measuring pollen tube length described (1) • record results every hour for 4 hours (1)	Ignore serial e.g. pH, sucrose concentration, temperature, light Accept magnification quoted $\geq 100\times$ e.g. stage micrometer and graticule	(4)

Question Number	Answer	Additional Guidance	Mark
3(e)	An answer that includes the following: • {both / germination and growth} show optimum at 100 mg dm⁻³ (1) • for growth boric acid concentrations above 100 mg dm⁻³ are inhibitory whereas for germination all concentrations above 100 mg dm⁻³ are stimulatory (1)		(2)