GradeMax



Mark Scheme (Results)

Summer 2021

Pearson Edexcel International Advanced Level
In Biology (WB13) 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

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:
• an idea of the types of response expected
• how individual marks are to be awarded
• the total mark for each question
• examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.

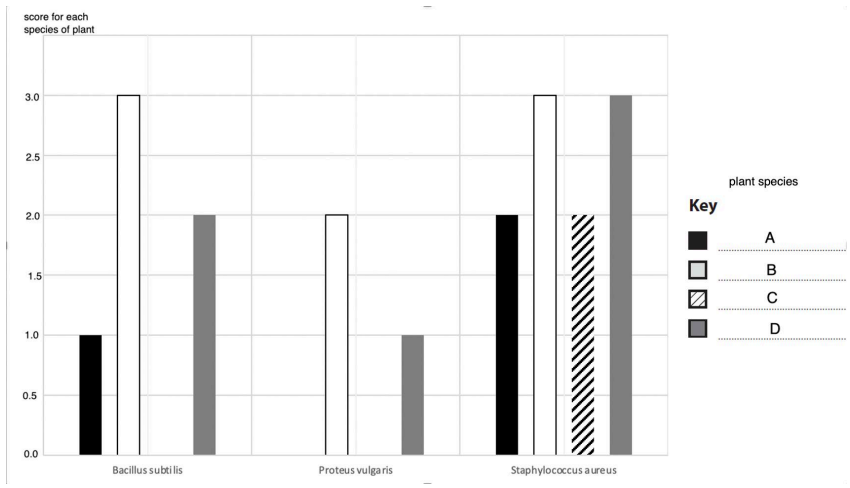
( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer. ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication
Questions which involve the writing of continuous prose will expect candidates to:
• write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear · select and use a form and style of writing appropriate to purpose and to complex subject matter · organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

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  	(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 >/= 100x	 (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 = no. of cells in mitosis ÷ 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 ÷ MI total no. of cells = 14 ÷ 0.05 = 280 / T = 1400 ÷ 5 = 280 correct answer with no working gains 3 accept T = 14 / 5 for 2	(3)

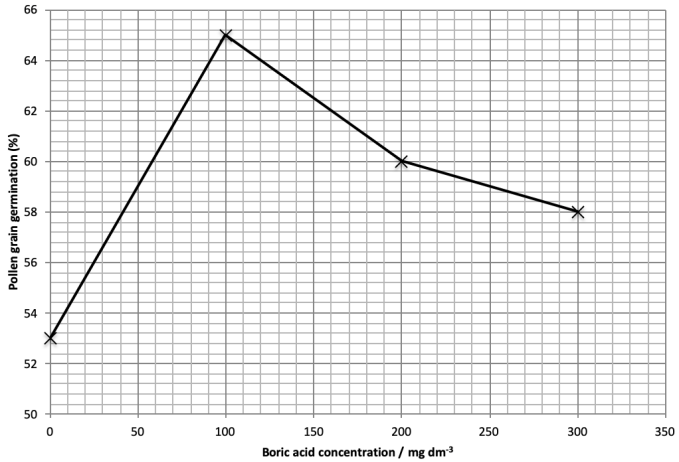
Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	A table drawn showing: • suitable table (drawn) (1) • headings root length with units, mitotic index with units (1) • data correctly entered (1)	2 columns and 6 rows or vice versa units in cells negates this mark Root Length / mm — Mitotic Index (%) 5(.0) — 0.0 6(.0) — 0.4 8(.0) — 0.8 10(.0) — 1.4 12(.0) — 1.8	(3)

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 ÷ 2 = 106 difference = {130.5 – 106 / 24.5} (24.5 ÷ 106) × 100 = 23 (%) ignore decimal places 130.5 – 106 ÷ 130.5 = 18.8 gets 1 **alternatives** 1. rate at 0 is 211 ÷ 2 = 105.5 = {130.5 – 105.5 / 25} (25 ÷ 105.5) × 100 = 23 (%) ignore decimal places 2. rate at 0 is 213 ÷ 2 = 106.5 = {130.5 – 106.5 / 24} (24 ÷ 106.5) × 100 = 22 (%) ignore decimal places 3. rate at 0 is 214 ÷ 2 = 107 = {130.5 – 107 / 23.5} (23.5 ÷ 107) × 100 = 22 (%) ignore decimal places 130.5 – 106 ÷ 130.5 = 18.8 gets 1 130.5 – 105.5 ÷ 130.5 = 19.2 gets 1 130.5 – 106.5 ÷ 130.5 = 18.3 gets 1 130.5 – 107 ÷ 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 >/= 100x 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)

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