Mark Scheme (Final)

Summer 2023

Pearson Edexcel International Advanced Subsidiary Level In Biology (WBI16)

Paper 01

Unit 6: Practical Skills in Biology II

Question Number	Answer	Additional Guidance	Mark
1a	• Anaphase (1)	Ignore ref to early / late anaphase Accept phonetic spelling	**1 grad**

Question Number	Answer	Additional Guidance	Mark
1bi	A description that includes six of the following points: • description of treatment of onion {plants/ roots} grown in caffeine solution (1) • use caffeine solution and without caffeine OR stated concentrations/number of caffeine concentrations(1) • use of root **tip** (1) • use of a suitable named stain (1) • method of preparing microscope slides (1) • counting cells under **microscope** (1) • description of how to calculate mitotic index (1)	Accept a concentrations without a 0% Accept description of tip e.g. terminal 5mm Toluidine blue/orcein/methylene blue/nile blue Teasing apart/squashing/macerate/treat with acid accept formula	**6 exp**

Question Number	Answer	Additional Guidance	Mark
1bii	A description that includes three of the following points: • β glucose (1) • **1-4 glycosidic** bonds (1) • every (other) glucose molecule inverted (1) • the molecule is a {straight chain/unbranched} (1)	Accept beta /b/B Accept from diagram Ignore cellulose molecules joining together	**3 exp**

(Total for question 1 = 10 marks)

Question Number	Answer	Additional Guidance	Mark
2a	• Appropriate suggestion linked to benefit	E.g. shelter for wind/sun (so) reduced water loss/transpiration Animals graze mimosa before cactus Shelter helps cactus seedlings establish Accept other valid suggestions	**1 exp**

Question Number	Answer	Additional Guidance	Mark
2b	• identify a suitable risk such as being infected/ bitten/allergic reaction/irritant/sunburn/spines/dehydration/ trip hazard (1) • Appropriate description of how to reduce the risk (1)		**2** exp

Question Number	Answer	Additional Guidance	Mark
2c i	• correct selection of data/ration • both ratios correct and divided correctly • correct final odds ratio	Step 1 = 60 ÷ 16 OR 3.75 Step 2 = 4 ÷ 20 OR 0.2 Odds ratio = 3.75 ÷ 0.2 OR 18.75 19 (not 19.0) Correct answer gains 3 marks ECF for MP2 and answer to 2sig fig if data/ratio incorrect	**3** exp

Question Number	Answer	Additional Guidance	Mark
2cii	• The cactus plants are found growing in association with the **mimosa/ tree**	Ignore text lifted from the question without qualification	**1 exp**

Question Number	Answer	Additional Guidance	Mark
2di	An answer that includes two of the following points: Abiotic • Temperature (1) • pH (1) • water content (1) • mineral content/salinity (1)	*Only mark the first response on each line* Accept soil moisture Accept soil stucture/compaction/depth/oxygen /carbon dioxide content	**2 exp**

Question Number	Answer	Additional Guidance	Mark
2dii	• results are not **valid** / description of expected effect on the dependent variable (1)	Description of effect must be directional eg increase temperature increases enzyme activity	**1 exp**

(Total for question 2 = 10 marks)

Question Number	Answer	Additional Guidance	Mark
3a	• There is no (significant) **difference** between the number of pupae from the untreated (A) and treated culture (B) medium	Ignore eggs hatched	**1 exp**

Question Number	Answer	Additional Guidance	Mark
3b	• suitable table format with data correct column headings (1) • means correctly calculated (1)	**Number of pupae** A/untreated / B/treated 72 / 45 68 / **56** **81** / 39 56 / 40 **43** / **29** 52 / 38 60 / 35 64 / 46 Mean 62 / Mean 41	**2 exp**

Question Number	Answer	Additional Guidance	Mark
3c	• bar graph with linear scale and labels (1) • means plotted correctly (1) • range bars plotted correctly (1)	**mean** number of pupae/culture or treatment/ A B. y axis must start at zero ALLOW ECF for incorrect means from 3bi Range bars **81-43 56-29**	**3 exp**

Question Number	Answer	Additional Guidance	Mark
3di	• correct substitution of given $(S_A)^2$ and $(S_B)^2$ (1) • correct answer (1)	ECF allow use of incorrect means Correct square root reduces to 5.109 t = 4.11 (4.1) Correct answer only gains 2 marks accept additional decimal places	**2 exp**

Question Number	Answer	Additional Guidance	Mark
3d ii	• the calculated value of *t* (4.11) is **more than** the critical value **2.14** (1) • therefore reject the null hypothesis there is a difference between the treated and untreated groups (1)	Allow ECF from 3di if calculated value is less than stated critical value Accept critical value of 2.98	**2 exp**

Question Number	Answer	Additional Guidance	Mark
3e	An answer that includes two of the following points: • use other masses of pyrethrum (1) • leave adults to lay eggs for more than 24 hours (1) • Leave eggs for more than 5 days (to see if more hatch/pupate) (1)	ignore repeat the expt/amount accept concentration/volume accept more time accept more time	**2 exp**
Question Number	**Answer**	**Additional Guidance**	**Mark**
3f	An answer that includes two of the following points: • Pyrethrum/concentration/ mass may have no effect on the flies/flies resistant (1) • Pyrethrum may be washed/blown off fruits (1) • pyrethrum may not reach eggs (1) • fruit damaged by {being eaten/pests/weather} (1)	accept flies become resistant Fruit skin might prevent pyrethrum entering fruit	**2 exp**

(Total for question 3 = 14 marks)

Question Number	Answer	Additional Guidance	Mark
4a	A description that includes two of the following points: • find a suitable mass/age of leaves/concentration of extract/method of extraction (1) • find a suitable temperature/pH/medium/time/species of bacteria (1) • find suitable method to measure {inhibition/antibacterial effect} (1)	A method to provide quantitative results	**Exp 2**

Question Number	Answer	Additional Guidance	Mark
4b	An answer that includes nine of the following points: • clear statement of the **dependent variable** e.g.zone of inhibition (1) • description of method of preparation of extract (1) • method of preparing bacterial lawn/broth/pour plate (1) • method of applying extract (1) • detail of measuring dependent variable (1) • description of aseptic technique (1) • use of a control for comparison (1) • Incubate at **stated** temperature (1) • **two** variables that need to be controlled (1) • method of control of **one** named variable (1) • repeat the whole experiment to calculate (mean) and SD/error bars (1)	Ignore amount ALLOW different valid methods. Wells/discs/drop in broth/serial dilution/put on agar e.g. ruler/grid/different orientations ignore taping dishes But not more than 30˚ e.g. temperature/pH/incubation time/size of disc/medium/species of bacteria/source/mass of leaves accept to measure variability of data	**9 exp**

Question Number	Answer	Additional Guidance	Mark
4c	An answer that includes the following points: • table for collecting **raw** data with **headings** and **units** with means calculated from repeats (1) • bar graph format with labelled axes (1) • use of an appropriate statistical test (1)	accept with several concentrations description of mean calculated in text or mean on one graph label accept line graph if several concentrations used Accept a (named) correlation test with line graph a test for difference if bar graph	**3 exp**

Question Number	Answer	Additional Guidance	Mark
4d	An answer that includes two of the following points: • difficult to measure distances/diameters/ZOI with precision (1) • only tested against one species of bacteria (1) • contamination (1) • bacteria cultured in aerobic conditions and gut is anaerobic or not cultures at human body temperature (1)	Accept errors in use of colorimeter Accept the bacteria used might be resistant Accept conditions might not be aseptic Ignore ref to pathogens	**2 exp**

(Total for question 4 = 16 marks)