Pearson Edexcel

Mark Scheme (Results)

October 2024

Pearson Edexcel International Advanced Level
In Biology (WBI16)
Paper 01 Practical Skills in Biology II

Question Number	Answer	Additional Guidance	Mark
1a	An answer that includes the following: • convert starch to maltose (1)	Allow convert amylose / amylopectin Allow breakdown / digest / hydrolyse Allow convert to glucose	1

Question Number	Answer	Additional Guidance	Mark
1b	A description that includes six of the following points: • use of aseptic technique (1) • {cut seed in half / to separate endosperm from embryo} (1) • soak **both halves** in gibberellin (1) • use of control (from grains) not soaked in gibberellin (1) • place (grain halves cut side down) on **starch** agar plate (1) • incubate for a stated time (range 24-48 hours) / at a {stated / fixed} temperature (1) • add iodine (to plate after incubation) (1) • description of how results can be compared (1)	Allow wash with sterile water / sodium hypochlorite also in preparing plate Allow soak in water Do not allow waterbath Ignore zone of inhibition	6

Question Number	Answer	Additional Guidance	Mark
1c	A description that includes three of the following points: • gibberellin is a transcription factor (1) • **increasing** the transcription (of amylase mRNA) (1) • (resulting in) translation of amylase (1)	Ignore genes / cAMP Allow starts / stimulates / enables transcription Allow enzyme / protein	3

(Total for question 1 = 10 marks)

Question Number	Answer	Additional Guidance	Mark
2a	• suitable risk clearly identified (1) • reduction of risk identified to the scientist (1)	Candidates will express this in a number of different ways e.g. breaking fibre damages eye so use goggles / safety screen; allergies to plant / fibre so wear gloves; hydrogen peroxide is irritant so wear gloves; falling masses may cause injury so place a cushion beneath / stand back	2

Question Number	Answer	Additional Guidance	Mark
2b	• correct mean calculated (1) • correct percentage increase (1) • correct answer to 3 sig figs (1)	ECF for using incorrect means for MP2 and 3 834 10.432 10.4 Correct answer only gains 3 marks	3

Question Number	Answer	Additional Guidance	Mark
2ci	An answer that includes two of the following points: **Abiotic** • pH (of soil) (1) • water content (of soil) (1) • organic matter (of soil) (1) • concentration of hydrogen peroxide (1) **Biotic** • age of { plant / fibre} (1) • species (1) • {diameter / length} of fibre (1)	Allow humidity (in room) Allow mineral content (of soil), ignore nutrients Allow variety / cultivar / type Allow thickness	2

Question Number	Answer	Additional Guidance	Mark
2cii	• description of an appropriate method of control (1)	Allow control of temperature or other unsuitable variable If water / pH selected it must be controlled in soil	1

Question Number	Answer	Additional Guidance	Mark
2d	A description that includes two of the following: • (long) cells with {secondary thickening / lignin} (1) • end wall present (1) • {dead cells / no cell contents / hollow} (1) • pits present (1)		2

Total for question 2 = 10 marks)

Question Number	Answer	Additional Guidance	Mark
3a	• there is no (significant) difference between the mitotic index at different oxygen concentrations (after 2 days) (1)	Candidates will express this in different ways	1

Question Number	Answer	Additional Guidance	Mark
3b	An answer that includes the following: • suitable table format with correct column headings and units (1) • all data correctly entered (1) • means correctly calculated (1)	Allow mitotic index % or au not if units in table 5.7 and 4.0 Do not allow 4	3

Question Number	Answer	Additional Guidance	Mark
3c	An answer that includes the following: • bar graph with linear scale starting at **zero** and axes labelled, with units (1) • means plotted correctly (1) • range bars plotted correctly (1)	**mean** mitotic index allow % as unit for mitotic index oxygen % ECF using the means from 3b Allow tolerance of half a small square 3.6 to 4.4 5.1 to 6.2	3

Question Number	Answer	Additional Guidance	Mark
3di	• correct substitution of given $(SA)^2$ and $(SB)^2$ (1) • correct answer (1)	Allow ECF if incorrect means used (denominator is 0.1499923) 11.33 / 11.3 Ignore minus sign	2

Question Number	Answer	Additional Guidance	Mark
3dii	An answer that includes the following points: • (pea seeds grown) under 20% oxygen have a larger mitotic index than those grown under 5% oxygen (1) • the calculated value of *t* (11.33) is more than the critical value 2.12 (1) • (therefore) reject the null hypothesis, the difference in the mitotic index at 5% oxygen compared to 20% oxygen is significant (1)	Allow any quoted t value and a following correct statement for MP2 and MP3 Allow 2.92 at 1% significance Allow different concentrations of oxygen	3

Question Number	Answer	Additional Guidance	Mark
3e	An answer that includes two of the following points: • use different temperatures (1) • use different oxygen concentrations (1) • use different times (1) • use different plant species (1)	Ignore repeat the expt Allow within the 5-20% range or a wider range Allow variety / cultivar / type	2

(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 / length} of pondweed (1) • find a suitable temperature/pH (for photosynthesis) (1) • find suitable method to measure the {oxygen / gas} production (1) • find suitable depth(s) of water or light intensity (1) • find a suitable **method to change** depth of water or light intensity (1)	A method to provide quantitative results Allow time to measure gas production Allow to change wavelength of light	2

	Answer	Additional Guidance	Mark
4b	An answer that includes nine of the following points: • clear statement of the dependent variable e.g. the volume of {gas / O_2} released per **unit time** (1) • description of method of measuring volume of gas (1) • method of standardising plants (1) • method of producing two (or more) different depths of water or different light intensities (1) • use of (sodium) **hydrogencarbonate** (1) • allow plant time to acclimatise (1) • {standardised / stated} time for gas collection (1) • one variable that need to be controlled and its method of control (1) • method of calculating rate (1) • {repeats / repeat the whole experiment} and calculate {means / SD's} (1)	Ignore amount / bubble /rate Allow distance moved per unit time Allow photosynthometer / labelled diagram Allow mass /length Ignore age Allow equilibrate Allow 10 mins to 24hrs (if given) e.g. temp / pH / wavelength / light intensity (if depth is changed) / depth (if light intensity is changed) e.g. distance ÷ time vol ÷ time number of bubbles ÷ time	9

Question Number	Answer	Additional Guidance	Mark
4c	An answer that includes the following points: • table for **raw** data with headings and units, with means calculated from repeats (1) AND • bar graph format with labelled axes (1) • use of a t test for difference (with a bar graph showing only two different light intensities) (1) OR • {line / scatter} graph format with labelled axes (1) • use of a correlation test (with a line graph showing more than two different light intensities) (1)	Reject rate in heading Allow description of mean calculated in text or mean on one graph label Graph must be clearly sketched or stated Allow named test Graph must be clearly sketched or stated Allow named test	3

Question Number	Answer	Additional Guidance	Mark
4d	An answer that includes two of the following points: • difficult to measure {distances along capillary tube / volume} with precision (1) • difficult to control surface area of {leaves / plant} (1) • a described difficulty with the apparatus (1)	Ignore bubbles e.g. oxygen dissolves in water / oxygen used in respiration / temperature change due to lamp / hard to exclude ambient light	2

Total for question 4 = 16