Pearson

Mark Scheme (Results)

June 2023

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

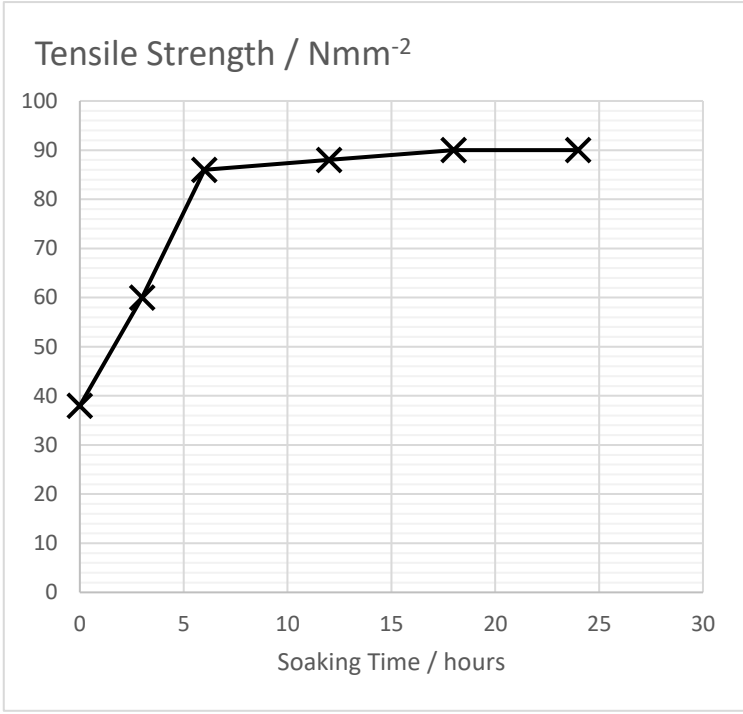
Question Number	Answer	Additional Guidance	Mark
1ai	An answer that includes the following • sclerenchyma (1) • xylem (vessel) (1)	IGNORE phloem, companion cells, cambium, parenchyma	**grad 2**

Question Number	Answer	Additional Guidance	Mark
1aii	An answer that includes the following: • (increased) {strength / support / hardness / rigidity} (1) • makes cell (wall) impermeable / reduces permeability or description e.g., stops / reduces water entering or leaving (1)	IGNORE flexible ACCEPT stops anything going in or out / makes (cell wall) waterproof	**expert 2**

Question Number	Answer	Additional Guidance	Mark
1bi	• (soaking) time (1)		**grad 1**

Question Number	Answer	Additional Guidance	Mark
1bii	An answer that includes the following points: • cut {thin / transverse} section (of fibre) / lay (fibre on slide) on microscope (1) • measure using (eyepiece) graticule (1) • which has been calibrated (with stage micrometer) (1)	ACCEPT description of calibration	**expert 3**

Question Number	Answer	Additional Guidance	Mark
1biii	An answer that includes the following points • fibre {diameter / radius} is needed to calculate (cross sectional) area (1) • (cross sectional) area is needed to calculate tensile strength / strength of fibre (1) • diameter will affect {tensile strength / strength of fibres} (1)	ACCEPT diameter is needed to calculate tensile strength for 1 mark	**expert 2**

Question Number	Answer	Additional Guidance	Mark
1ci	A graph with the following features • A axes correct (x – soaking time, y- tensile strength) (1) • L all labels correct (x- soaking time / hours, y- tensile strength / Nmm^{-2}) (1) • P plots correct on a linear scale on both axes (1) • S points joined with straight lines (1)	They lose mp S if they extrapolate beyond 24 hours. They can split the y-axis as long as they show it clearly, or they can start at numbers above zero Neither axis has to start at zero, just make sure it is linear 	**expert 4**

Question Number	Answer	Additional Guidance	Mark
1cii	An description that includes three of the following points • soaking time increases (tensile) strength (1) • relationship is (nearly) linear {up to 6 hours / from 6 to 18 hours} (1) • {large / significant / rapid} increase up to 6 hours / more than doubles up to 6 hours (1) • slow increase (after 6) / no increase after 18 hours / levels off (1)	DO NOT piece together, must be a clear statement ACCEPT manipulation to show size of increase	**expert 3**

Question Number	Answer	Additional Guidance	Mark
2a	An answer that includes the following: • A divide to form the **male** (gamete / nuclei) (1) • B produces (digestive) enzymes / digests the style / makes pathway (for male gamete / to ovum) /grows towards ovum (1)	ACCEPT ovary, ovule, female gamete, egg	**expert 2**

Question Number	Answer	Additional Guidance	Mark
2b	An answer that includes the following points: • credit suitable methods used (to observe germination of pollen grains) (1) • sucrose solution added (1) • suitable time quoted before germination rate assessed (1) • control of one relevant abiotic variable (1) • control of one relevant biotic variable (1) • view through microscope / count germinated & non-germinated / count germinated & total (and work out percent) (1) • reference to relevant health and safety issue (1)	e.g. hanging drop, agar plates, filter paper, cavity slide ACCEPT boron / sugar. > or = 15 minutes < or = 5 days temperature, pH, light, sucrose concentration, fixed time species, a cultivar, variety of plant, type species of bee e.g. pollen allergy, bee stings	**Expert 5**

Question Number	Answer	Additional Guidance	Mark
2ci	An answer that includes the following points: • the optimum is at higher temperature for bee than hand collected pollen / described / both optima quoted (30C and 36C) (1) • the percentage germination is higher in hand (than bee collected pollen at all temperatures) (1) • range in percentage germination in hand greater than in bee collected / fall from optimum {higher / steeper} in hand than bee collected/ temperature has greater effect on hand collected (1) • enzymes denature (above the optimum / above 30C and 36C in both) (1) • there are no {error bars / SDs / SEs} (1)	ACCEPT both temperatures at which % germinations starts to go down quoted ACCEPT reverse arguments ACCEPT ranges quoted (-3 or -4 and -16) from 22 to 19/18 56 to 40/41 etc. or peak to lowest ACCEPT there is no measure of variability	**Expert 4**

Question Number	Answer	Additional Guidance	Mark
2cii	An answer that includes the following points: • repeat the experiment at 30C (1) • {all conditions / named condition} should be kept constant (1) • (mean and) SD (calculated) / error bars (1) • look for overlap in SDs / perform t-test (1)	IGNORE the number of repeats IGNORE temperature ACCEPT named **relevant** other test of difference	**Expert 4**

Question Number	Answer	Additional Guidance	Mark
2di	A calculation with the following steps:	Correct answer gets 3 marks with no working Ecf at mp 2 and 3	
	• lengths correctly read from graph (1)	1000 and 750	
	• subtraction followed by correct division using data above and multiplication by 100(1)	1000 – 750 = 250 then 250 ÷ 750 = 0.3333 OR 1000 – 750 = 250 250 ÷ 1000 = 0.25 OR 250 ÷ 875 = 0.2857	
	• quoted to correct sig figs. and as a percentage (1)	3.3 (%) 25.0 (%) 28.6 (%) Accept 25, 33 or 29 for 2 marks	**Expert 3**

Question Number	Answer	Additional Guidance	Mark
2dii	• pollen damaged (in bee sample)/ description (1)	ACCEPT reverse argument. Allow secrete something which affects pollen negatively/ collect less ripe pollen / bees selective / bee pollen from a different species	**expert 1**

Question Number	Answer	Additional Guidance	Mark
3ai	An explanation that includes the following: • prevents escape / spreading of (bacteria / *E .coli*) (1) • prevents {contamination of the agar or cultures with (other types of) bacteria) / cross contamination /effect on the results} (1)	accept ref validity If no other marks awarded ACCEPT prevents contamination	**Expert 2**

Question Number	Answer	Additional Guidance	Mark
3aii	An answer that includes four of the following points: • description of how a bacterial culture is made (1) • description of addition of extract (1) • control of feature of independent variable described (1) • incubate {at suitable quoted temperature / for suitable quoted time / same length of time} (1) • statement of what is measured related to method above if awarded (1)	e.g. paper disc / cut well e.g. disc size / wells same size / {volume / age} / of extract temp. <30 but > 10, time 1 day to 7 days zone of inhibition clear area / turbidity	**expert 4**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3b</td><td>A table with the following features:

• suitable table drawn (1)

• all headings correct with units (1)

• all data correctly entered (1)</td><td>Must all be quoted to one decimal place.

<table><tr><td colspan="4">Inhibition of growth / au</td></tr><tr><td colspan="2">Roselle</td><td colspan="2">Clove</td></tr><tr><td>Ethanol</td><td>Water</td><td>Ethanol</td><td>Water</td></tr><tr><td>21.1 / 21.0</td><td>15.6 / 15.5</td><td>17.4 / 17.5</td><td>13.0/ 13.1 / 13.2</td></tr></table>Units in cells loses mp 2</td><td>expert 3</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
3ci	1.2:1 / 1.23:1 / 0.83:1	ACCEPT the other way round in any case	**Grad 1**

Question Number	Answer	Additional Guidance	Mark
3cii	An answer that includes the following points: • Ethanol **extract** {is more effective / better than / gives higher inhibition of growth than / has higher antimicrobial properties} (extract made with water) (1) • Roselle (extract) {is more effective / better / gives higher inhibition of growth than / has higher	ACCEPT reverse argument	**expert 2**

	antimicrobial properties} } (than the clove extract) (1)		

Question Number	Answer	Additional Guidance	Mark
3d	An answer that includes two of the following points: • {enzymes / protein} needed for growth / relevant processes described (1) • pH is no longer **optimal** (for growth) (1) • because {enzymes / proteins} are denatured (by pH change) (1) • lower pH affects (hydrogen / ionic) bonding / R groups (in proteins / enzymes) (1)		**expert 2**