Mark Scheme (Results)
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Pearson Edexcel International Advanced Level
In Biology (WBI03) Paper 01
Practical, Biology and Research Skills

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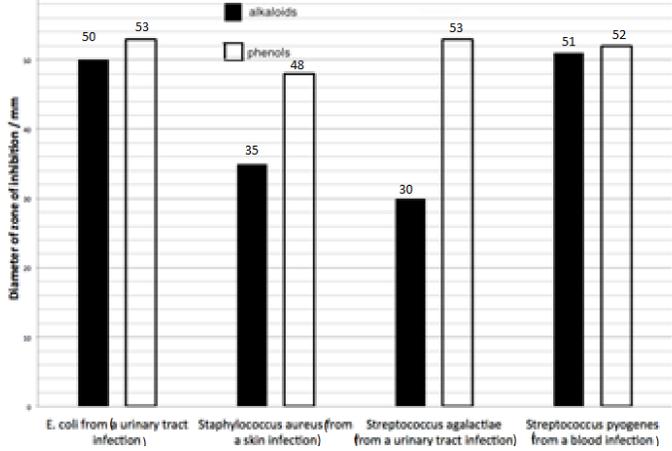
General Marking Guidance

- 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.

Question Number	Answer	Additional Guidance	Mark
1(a)(i)	1. {diameter / radius / area / width} of {zone of inhibition / clear zone / eq} ;	Look at the answer as a whole. If mp1 not awarded (e.g. they say 'size of zone of inhibition') but they go and say 'measure the diameter with callipers' , then both marks could be awarded	
	2. method of measurement described ;	Mp 2. e.g. using callipers, ruler {with suitably small divisions / eq}, take several diameters and find the mean, graph paper	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	1. filter paper discs soaked in {solvent / eq} / filter paper disc with no extract / use {plain water / solvent / eq} ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	1. temperature (of incubation) ;	If variable stated is inappropriate a mark can still be awarded for a correct method of control	
	2. incubator / eq ;	Mp2 ACCEPT oven / thermostatically controlled {chamber / room} a {chamber / room / eq} at {fixed / sensible stated temp.} Do not accept an form of water bath	
	3. pH ;		
	4. use a buffer ;		
	5. same {mass / age} of frits used ;		
	6. balance OR from {same plant / source / eq} ;		
	7. same {size / thickness / material / eq} filter paper disc ;		
	8. ref. hole punch / choice of material to use / stated appropriate diameter ;		
	9. volume of solution placed on disc ;		
	10. use of suitable measuring equipment, e.g pipette ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	B bar chart A axes correctly labelled as (x – has bars identified as each bacterial species, y- diameter of {zone of inhibition / Z I} with units ; K phenols and alkaloids identified ; P correct plotting ; S suitable scale ;	 S linear, half of grid minimum, do not accept discontinuity	**(5)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	1. phenols are overall more effective ; 2. (little / no) difference between alkaloids and phenols on {*E. coli / S. pyogenes*} ; 3. big difference between alkaloids and phenols on {*Streptococcus agalactiae / Staphylococcus aureus*} ; 4. manipulation of data to support ;	e.g. calculation of mean for each chemical (alkaloids 41.5, phenols 51.5) any difference quoted E. c. 3 (mm) S aur 13 (mm) S aga 23 (mm) S pyo 1 (mm) or any proportion correct E.c A/P = 0.94, P/A = 1.06 S aur A/P = 0.73, P/A = 1.37 S aga A/P = 0.57, P/A = 1.77 S p A/P = 0.98, P/A = 1.02 or percentage Ec P only 6% better than A, A S aur P 37% better S aga P 77% better S p P only 2 % better (or vice versa)	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(b)(iii)	1. each experiment should be repeated ; 2. calculate {standard deviation / standard error} / find the range ;	Allow explanation of how the variability of the data could be calculated	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(b)(iv)	1. idea of plotting a mean ; 2. {range bars / error bars / standard deviation / standard error} plotted ;		**(2)**

Question Number	Answer	Additional Guidance	Mark
1(c)	**Advantages** 1. Plant extracts are {cheap / readily available / easy to obtain / eq} ; 2. idea that bacteria (may) not (become) resistant to plant extracts ; **Disadvantages** 3. plant extracts have not been through (clinical) trials / (correct) dosage unknown / eq ; 4. there may be {long term / side} effects of using plant extracts/ eq ;		**(3)**

Question Number	Answer	Additional Guidance	Mark
2(a)	**main solution** implant the azot gene ; **alternative solution** the use of {ibuprofen / modified virus / telomerase} ;		**(1)**

Question Number	Answer	Additional Guidance	Mark
2(b)	1. one suitable {bar graph / table / pie chart} drawn ; 2. {four / five} {bars / rows / columns / segments} ; 3. {axes / headings / segments} correctly labelled ; 4. suitable title giving the idea of effect of **(different) treatments** on {**ageing / lifespan}** of **organisms** ;		**(4)**

Question Number	Answer	Additional Guidance	Mark
2(c)(i)	1. 7.8 ;	accept 7.7 , 7.9	**(1)**

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)		Look at the answer as a whole.	
	1. 8 to 50 ;	Accept range: (7-9) to (49-51) Accept any correct subraction to give range as a single figure 51-7 = 44 50-7 = 43 49-7 = 42	
	2. idea of using a horizontal line for age 22 or telomere length ;	51-8 = 43 50-8 = 42 49-8 = 41	
	3. read ages from + and – 1 SD / see where SD lines cross horizontal line / eq ;	51-9 = 42 50-9 = 41 49-9 = 40	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(d)(i)		IGNORE any ref. to repeating the experiment	
	1. correct explanation of what is meant by peer ;	peer in this context is someone with at least as much experience in the science involved as the people writing the paper ACCEPT "scientists" or "experts"	
	2. correct explanation of what is meant by a review ;	to check the {paper / results} to see if {correct / valid / original / significant / reliable}	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(d)(ii)	1. all 6 elements present with no extras i.e. names, date, article title, journal, volume number and pages do not award if "vol.", "pages", "pp" are included ;	Savage, S A and Bertuch, A A. (2010) The genetics and clinical manifestations of telomere biology disorders. Genetics in Medicine, 12 (753-764).	
	2. order correct ;	there must be a minimum of 4 elements in the correct order to judge this	
	3. reference has names followed by initial(s) ;	ACCEPT "et al" with one name	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(e)(i)	1. changed views on marriage ;		
	2. changed interaction between siblings and parent ;		
	3. fall in incidence of depression / stress ;		**(3)**

Question Number	Answer	Additional Guidance	Mark
2(e)(ii)	1. idea of religious objections ; 2. idea of objections to genetic engineering ; 3. idea of objections to use of animals ; 4. idea of objections to experimenting on humans ;		**(3)**