



GCE A LEVEL MARKING SCHEME

SUMMER 2018

**A LEVEL (NEW)
BIOLOGY - UNIT 5
1400U50-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC GCE A LEVEL BIOLOGY
UNIT 5 - PRACTICAL EXAMINATION
SUMMER 2018 MARK SCHEME
GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark.

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.
Crossed out responses not replaced should be marked.

Credit will be given for correct relevant alternative responses which are not recorded in the mark scheme.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

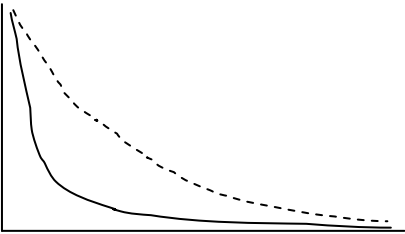
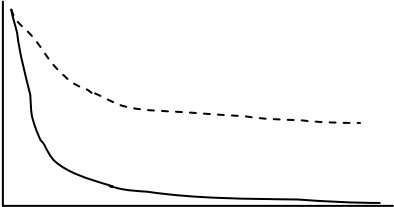
cao = correct answer only

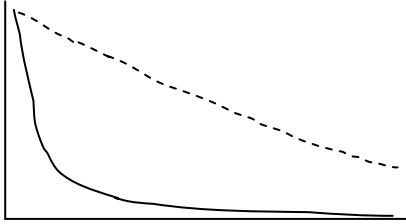
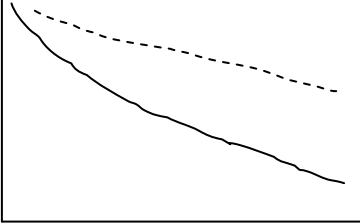
ecf = error carried forward

bod = benefit of doubt

Unit 5 – EXPERIMENTAL TASK MARK SCHEME

Question				Marking details	Marks Available						
					AO1	AO2	AO3	Total	Maths	Prac	
1				Teacher Awarded: Volumes measured accurately seen once (1) Time for disc to drop and rise measured to accurately to nearest second seen once (1)		1 1				2	2
	(a)			Table: <ul style="list-style-type: none"> headings for IV and DV correct [Concentration of H₂O₂ or hydrogen peroxide + Time taken to sink and rise] + clear indication of which trials were with water and which copper sulfate (1) correct units for concentration (vol), time (s/ seconds/ e/ eiliadau) (1) Reject mol dm⁻³/ v/ vols/ % vol/ secs/ sec/ minutes/ minutes + seconds all times recorded to nearest second (1) Ignore numbers of repeats means for both with and without inhibitor calculated correctly(to nearest second) (1) Accept to 1d.p. Penalise if only one set of readings for either with or without inhibitor unless explained Same marking points if in 1 table or 2 tables If 2 tables BOTH tables must be correct to get the marks	1 1	1 1				4	4
	(b)			<ul style="list-style-type: none"> labels x axis = concentration of peroxide + y axis = mean time for disc to fall and rise (1) correct units x= vol, y = s (1) at least half the grid used in both directions (1) linear scales correct on both axes (1) plots correct +/- ½ small square (2) [-1 each error] suitable labelled lines drawn for each (1) Accept suitable key 	1 1 1	1 1 2		7		2	7

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
(c)	(i)		<p>Correct conclusion from their results/ graph – {competitive/non-competitive/cannot tell } (1)</p> <p>Any one from: If competitive, time taken with copper sulphate decreases as concentration of peroxide increased (1)</p>  <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Ideal competitive inhibitor:</p> <ul style="list-style-type: none"> • no CuSO₄ has reached fastest time/V_{max} • time with CuSO₄ slower but starts to approach fastest time/V_{max} at highest concentration </div> <p>if non-competitive inhibitor, time taken with copper sulphate would not have decreased at higher concentration of peroxide (1)</p>  <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Ideal non-competitive inhibitor:</p> <ul style="list-style-type: none"> • no CuSO₄ has reached fastest time/V_{max} • time with CuSO₄ slower and does not start to reach fastest time/V_{max} at highest concentration </div>			1			
							1	2	

Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
	<p>Competitive because still getting faster with increased concentrations / Can't tell because {with/without competitor} time does not level off (1)</p>  <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Competitive inhibitor/ inconclusive results re type of inhibitor:</p> <ul style="list-style-type: none"> • no CuSO_4 has reached fastest time/V_{max} • time with CuSO_4 slower, gets faster but highest concentration not enough to show if it will reach fastest time/V_{max} </div>  <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Competitive inhibitor/ inconclusive results re type of inhibitor:</p> <ul style="list-style-type: none"> • no CuSO_4 has not reached fastest time/V_{max} • time with CuSO_4 slower, gets faster but can't tell which type of inhibitor as no CuSO_4 has not reached fastest time/V_{max} </div> <p>Can't tell (results too variable) + some indication of what they would have expected to reach a valid conclusion(1)</p>						

Question			Marking details	Marks Available																					
				AO1	AO2	AO3	Total	Maths	Prac																
		(ii)	<p>3 inaccuracies + 1 improvement for each (1 mark each)</p> <p>The following are examples. Allow other sensible sources of inaccuracy as long as a suitable and valid improvement is given.</p> <table border="0"> <tr> <td>inaccuracy</td> <td>improvement</td> </tr> <tr> <td>different quantity of yeast/potato extract on paper discs</td> <td>soak disc for same length of time (1)</td> </tr> <tr> <td>used the same H₂O₂ for both readings</td> <td>use fresh H₂O₂ for each reading (1)</td> </tr> <tr> <td>temperature could have changed</td> <td>use a thermostatically controlled water bath (1)</td> </tr> <tr> <td>pH was not controlled</td> <td>use a pH buffer (1)</td> </tr> <tr> <td>did not stir yeast/potato extract</td> <td>stir consistently</td> </tr> <tr> <td>Accuracy of measuring cylinder/ syringe (only measures to / low resolution)</td> <td>use {graduated pipette/ measuring cylinder/ syringe} with higher resolution</td> </tr> <tr> <td>Paper discs not uniform area</td> <td>Use paper discs which are identical</td> </tr> </table> <p>Do not accept human error or the following as they are told to do these in the method:</p> <ul style="list-style-type: none"> • did not wash forceps • used more than 1 disc at the same time • did not remove first disc from the H₂O₂ • paper sticking to side 	inaccuracy	improvement	different quantity of yeast/potato extract on paper discs	soak disc for same length of time (1)	used the same H ₂ O ₂ for both readings	use fresh H ₂ O ₂ for each reading (1)	temperature could have changed	use a thermostatically controlled water bath (1)	pH was not controlled	use a pH buffer (1)	did not stir yeast/potato extract	stir consistently	Accuracy of measuring cylinder/ syringe (only measures to / low resolution)	use {graduated pipette/ measuring cylinder/ syringe} with higher resolution	Paper discs not uniform area	Use paper discs which are identical			3	3		3
inaccuracy	improvement																								
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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		Correct comment on their results (1) {only repeated once/only 2 results for each concentration/large variation between repeats} + repeat more times to improve reliability (1) Reject reference to accuracy			1 1	2		2
				Question Total	5	8	7	20	4	20

Unit 5 Practical Analysis Mark Scheme

Question			Marking Details	Marks available																
				AO1	AO2	AO3	Total	Maths	Prac											
1	(a)		A Larva/ pupa killed by a parasitic wasp B Larva or pupa still inside C Larva eaten by a bird All correct for 2 marks 2 correct for 1 mark 0/1 correct = 0 marks		2		2			2										
	(b)	(i)	Risk factor: {Holly spines/ holly leaves are sharp and} can pierce the skin (1) Precaution: Wear {protective/eq} gloves/long sleeves (1) Risk factor: Holly spines can damage eyes (1) Precaution: Wear goggles/ eye protection (1) Accept Risk factor: Wasp sting/ allergy to holly (1) Precaution: Wear gloves/long sleeves (1)	1	1		2			2										
		(ii)	They have the same susceptibility to leaf miner attack/They would be susceptible to the same species of leaf miner		1		1			1										
	(c)	(i)	<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>(O-E)</th> <th>(O-E)²</th> <th>$\frac{(O-E)^2}{E}$ (1)</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>100</td> <td>7.69</td> </tr> <tr> <td>-5</td> <td>25</td> <td>1.92</td> </tr> <tr> <td>-5</td> <td>25</td> <td>1.92</td> </tr> </tbody> </table> Correct (O-E) ² (1) Correct $\frac{(O-E)^2}{E}$ (1) [If last column correct + (O-E) ² blank award 2 marks] $\chi^2 = 11.53 / 11.54(1)$ If use -25 (not 25) then max 1 if answer = 3.85	(O-E)	(O-E) ²	$\frac{(O-E)^2}{E}$ (1)	10	100	7.69	-5	25	1.92	-5	25	1.92		3		3	3
(O-E)	(O-E) ²	$\frac{(O-E)^2}{E}$ (1)																		
10	100	7.69																		
-5	25	1.92																		
-5	25	1.92																		

	(ii)	2		1		1		
	(iii)	<p>Critical value = 5.99 (1) ecf from (ii) [3.85 critical value = 7.82] Reject null hypothesis (1) ecf from (ii) [accept null hypothesis if 3.85] The calculated value of χ^2 is greater than the critical value (at 5%/ 0.05 probability) (1) ecf from (i) [reverse argument] Any one x (1) from ecf from (ii) [reverse argument]</p> <ul style="list-style-type: none"> • {Deviation is/ differences are} not due to chance alone/ • Individuals do not die equally at all life cycle stages/ • more die as eggs than as larvae or pupae/ • there is a significant difference between the observed and expected results <p>Reject Results are not due to chance alone</p>		1	3	4		

Question			Marking Details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		Have a larger sample of holly leaves/ more leaves (1) Repeat investigation {using another tree/ the same tree} (1) Ensure leaves all observed within a short time/ same time of year (1) ensure all leaves grow at the same height on the tree/ age of tree /age of leaves (1) Reject use a lower probability e.g. 0.01/ repeat experiment	1	1	1	3		3
	(e)	(i)	Any 2 (x1) of: same altitude/ same distance from sea/ same side of tree e.g. north facing	1	1		2		2
		(ii)	Any 2 (x1) of: number of predators/ birds (1) number of parasites/ wasps (1) {nutrient/ water} availability for holly/ {size/ surface area} of leaves(1) Accept disease qualified e.g. holly miner disease		2		2		2
Question Total				3	14	3	20	4	11

Question			Marking Details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
2	(a)		3 correct labels [pollen sac, line of dehiscence and vascular tissue] with label lines ending within the structure labelled, not on its margin. (3) Accept words or letters Accept brackets to show position if clear	3			3		3
	(b)	(i)	A = 8 + B = 9 + C = 7(1) 24 ÷ 3 = 8.0 (1) /ecf from measurements in epu(1) Accept if measured in mm and correctly converted to epu and mean calculated A = 11mm x 0.714 = 7.854 epu B = 13mm x 0.714 = 9.282 epu C = 10mm x 0.714 = 7.140 epu mean = 8.0/8.1 (2) Accept ecf if measure in mm, convert to epu incorrectly but calc mean based on incorrect conversion (1) Reject if measured in mm and mean calculated in mm (0)		2		2	1	2
		(ii)	1 epu = $\frac{96}{100} \times 10 = 9.6 \mu\text{m}$		1		1	1	
		(iii)	8.0 x 9.6 = 76.8 μm /ecf from (b) (i) (should be the same number of dp as (ii))		1		1	1	
	(c)	(i)	Accept any value between x40 and x100	1			1		
		(ii)	<i>Triticum aestivum</i> is likely to be wind pollinated (1) {Small / light / smooth/ large quantity of} pollen/ {anthers/ stigma} outside flower/ lack of {brightly coloured petals/ scent/ nectar} (1)	1		1	2		
Question Total				5	4	1	10	4	5

A2 UNIT 5 – PRACTICAL EXAMINATION - SUMMARY OF ASSESSMENT OBJECTIVES

Experimental Task	Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
	TOTAL	5	9	6	20	4	20
Practical Analysis Task	1	3	13	4	20	2	11
	2	5	4	1	10	4	5
	TOTAL	8	17	5	30	6	16
	OVERALL TOTAL	13	26	11	50	10	36