



GCE A LEVEL MARKING SCHEME

SUMMER 2022

**A LEVEL
BIOLOGY – UNIT 5
1400U50-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2022 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 2022 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

EXPERIMENTAL TASK MARK SCHEME

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1.	(a)			Teacher Awarded: Extract remains clear (1) Table: headings correct (1) [various ways of stating this] Test 1 – Length of germination (1, 2, 5, 8, 10) Test 2 – Temperature at which seeds were germinated (5, 15, 20, 35,45) DV (both tests) - Time taken for iodine to not change colour/ time taken for black colour to disappear/ time taken for black to turn brown Reject time taken to change unqualified/ time taken for iodine to turn brown units correct <u>column headings only</u> (1) IV Test 1 = days Test 2 = °C And DV s or seconds Reject secs NOTE: - if heading for IV Test 1 includes days eg., <u>Number of days of germination</u>, then accept this as the unit - If heading for DV includes, e.g..... to the nearest 10 seconds, then accept this as the unit - If mean column is not under heading for DV then the DV unit must be restated to get the heading and/or unit mark - all times recorded to nearest 10 seconds (1) If unit for DV is stated to nearest 10 seconds then mean must also be to nearest 10 seconds (unless different unit given for mean) means calculated and rounded correctly to max 1 dp, nearest second or nearest 10 seconds (1) Reject means calculated not using all data unless anomalous result stated Allow 'inverted table' IV across top and DV at side	1	1		1		1
					1					
					1					
								4		4
						1			2	
						1				

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		Any three (x1) from TEST 1: A. Seeds can be different {sizes/ masses} (1) B. And so each seed may contain {more / less/ different} concentrations of {amylase/ enzyme} (1) C. (Need to use the same mass of tissue to produce each extract) so that the activity of enzyme can be stated per gram of seed / results are comparable (1) D. (know that change in time for iodine to not change colour) is due to changing {conc of amylase / length of germination/ number of days} (1) TEST 2: A. Seeds can be different {sizes/ masses} (1) B. And so each seed may contain {more / less/ different} concentrations of amylase (1) C. use the same mass of seeds so that {results are more comparable / can state amylase activity per gram of seed} D. (do not know that change in time for iodine to not change colour) is due to {different concentrations of amylase / temperature of germination} (1)			3	3		3
		(iii)		(Subjective means) depends on your interpretation of the {colour / colour {vision/ perception}/ end point} varies between people (1) Less reproducible/ cannot replicate/ introduces inaccuracies into the data / suitable description (of overestimate or underestimate in time) / lead to differences in the times (1)			2	2		2
		(iv)		Times only recorded to the nearest 10 seconds (1) Ignore references to human error / stopwatch			1	1		2

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(v)		Photosynthesis {can take place/ provides source of glucose} / plant can make its own carbohydrate (so less amylase needed to break down starch stores) (1)			1	1		
				Question Total	5	9	6	20	5	19

PRACTICAL ANALYSIS TASK MARK SCHEME

Question				Marking details	Marks Available											
					AO1	AO2	AO3	Total	Maths	Prac						
1.	(a)	(i)		{Fur/ bone} are indigestible / {muscle/fat} are {digested/ broken down/ hydrolysed}		1		1								
		(ii)		3 small rodents eaten (1) Each jawbone comprises a left and right half (1)		1	1	2								
	(b)	(i)		<table><tr><th>Hazard</th><th>Risk</th><th>Control measure</th></tr><tr><td>Plants have sharp thorns</td><td>{Scratches on skin/ damaging eyes} (from plants) {<u>when collecting owl pellets/ when (working) in woodland/ when carrying out this fieldwork</u>}</td><td>Wear gloves/ cover skin/ eye protection</td></tr></table> Both risk and control measure correct for 1 mark	Hazard	Risk	Control measure	Plants have sharp thorns	{Scratches on skin/ damaging eyes} (from plants) { <u>when collecting owl pellets/ when (working) in woodland/ when carrying out this fieldwork</u> }	Wear gloves/ cover skin/ eye protection	1			1		1
			Hazard	Risk	Control measure											
		Plants have sharp thorns	{Scratches on skin/ damaging eyes} (from plants) { <u>when collecting owl pellets/ when (working) in woodland/ when carrying out this fieldwork</u> }	Wear gloves/ cover skin/ eye protection												
(ii)		Pellets are not randomly distributed / are only found below {owl roosts/ where owls live} (1) Ignore reference to size of quadrat		1		1	1									
(c)	(i)		{Categorical/ discontinuous} data / compare observed and {predicted/ expected} (numbers of rodents)	1			1	1								

Question				Marking details						Marks Available																																			
										AO1	AO2	AO3	Total	Maths	Prac																														
		(ii)		<table><tr><td>Species</td><td>Observed (O)</td><td>Expected (E)</td><td>O-E</td><td>(O-E)²</td><td>$\frac{(O - E)^2}{E}$</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Field vole</td><td>17</td><td>12</td><td>5</td><td>25</td><td>2.08/ 2.083</td></tr><tr><td>Wood mouse</td><td>7</td><td>12</td><td>-5</td><td>25</td><td>2.08/ 2.083</td></tr><tr><td>Total</td><td>24</td><td>24</td><td colspan="2"></td><td>4.16/ 4.17</td></tr></table>						Species	Observed (O)	Expected (E)	O-E	(O-E) ²	$\frac{(O - E)^2}{E}$							Field vole	17	12	5	25	2.08/ 2.083	Wood mouse	7	12	-5	25	2.08/ 2.083	Total	24	24			4.16/ 4.17						
				Species	Observed (O)	Expected (E)	O-E	(O-E) ²	$\frac{(O - E)^2}{E}$																																				
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Wood mouse	7	12	-5	25	2.08/ 2.083																																								
Total	24	24			4.16/ 4.17																																								
				4.16/ 4.17 for 3 marks Award 2 marks for $\frac{(O-E)^2}{E}$ = 2.08/ 2.083/ 2.1 (in both cells) 25/12 (in both cells) 4.2 as final answer Award 1 mark (O-E) = 5 and -5																																									
		(iii)	I	Number of species/ Number of {classes/ categories} of data Reject number of field voles and wood mice						1			1	1																															
			II	$\chi^2_{\text{calc}} > \chi^2_{\text{crit}}$ / 4.16 > 3.84 / ORA(1) $\therefore$ the null hypothesis is rejected (at 0.05 level of significance) (1) $\therefore$ there is a <u>significant</u> difference in the {number of field voles and wood mice in the diet/ numbers of observed and expected} / the difference in the {number of field voles and wood mice/ observed and expected results} is not due to chance alone (1) Must relate to calculated value from (c)(ii)							3		3	3																															

Question				Marking details	Marks Available											
					AO1	AO2	AO3	Total	Maths	Prac						
	(d)	(i)		{Trees/ woodland/ plants} are <u>living</u> organisms	1			1								
		(ii)		<table><tr><th>Abiotic factor</th><th>Explanation for control</th></tr><tr><td>Studies carried out at the same time of year</td><td>So the study is not affected by any other {physical factor/ named seasonal factor (e.g. temperature/ food availability/ day length) / behaviour (e.g. breeding season) of {trees/ rodents/ owls} (1)</td></tr><tr><td>Studies carried out at the same time of day</td><td>{Birds/ mammals} may be {active/ named activity} at different times of the day (1) Ignore reference to nocturnal unqualified</td></tr></table>	Abiotic factor	Explanation for control	Studies carried out at the same time of year	So the study is not affected by any other {physical factor/ named seasonal factor (e.g. temperature/ food availability/ day length) / behaviour (e.g. breeding season) of {trees/ rodents/ owls} (1)	Studies carried out at the same time of day	{Birds/ mammals} may be {active/ named activity} at different times of the day (1) Ignore reference to nocturnal unqualified		2		2		2
				Abiotic factor	Explanation for control											
				Studies carried out at the same time of year	So the study is not affected by any other {physical factor/ named seasonal factor (e.g. temperature/ food availability/ day length) / behaviour (e.g. breeding season) of {trees/ rodents/ owls} (1)											
Studies carried out at the same time of day	{Birds/ mammals} may be {active/ named activity} at different times of the day (1) Ignore reference to nocturnal unqualified															
(iii)		A. Decrease in owl pellets collected in both woodlands (between 1980 and 2015) / overall decrease in total number of owl pellets (1) B. Greater decrease in ash than coniferous (1) C. Example of human influence/ e.g. deforestation/ climate/ habitat destruction/ pollution (1) D. There are fewer ash {trees/ roosting sites} because of {Ash dieback / fungus infection of ash trees}/ more trees have died because of ash dieback (1) Ignore answers which compare results within 1980 and within 2015	1		3	4		3								
				Question 1 total	5	11	4	20	8	7						

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2.	(a)	(i)		(With x10 objective,) {magnification / resolution} too low/ ORA Ignore reference to lens being weak/ do not see enough detail	1			1		
	(b)	(i)		20 $\mu\text{m.}$ = 2 marks If incorrect award 1 mark for: 60/ 15 x 5 If incorrect measurement allow one mark for correct calculation Measurement/ 15 x 5		2		2	1	1
		(ii)		4.5:1 Ecf (i) 90/ value from (i)		1		1	1	1
		(iii)		Cells {develop vacuoles/ take in water/ carry out osmosis} + so cells get {longer/ larger}			1	1		
	(c)	(i)		Centromere labelled with clear line		1		1		1
		(ii)		Chromatid labelled with clear line		1		1		1
	(d)	(i)		Chromosomes {transparent/ not coloured / do not reflect visible light} (but stain does)/ light passes through chromosomes/ staining increases the contrast	1			1		1
		(ii)		Acetic orcein / acetic carmine / Feulgen / methylene blue Allow ethano-orcein / propionic orcein / toluidine blue/ Giemsa Reject Benedicts/ crystal violet/ iodine/ methyl blue	1			1		1

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		To focus the whole depth of the specimen at the same time / microscope has a very small depth of focus/ (there are too many layers of cells/ it is too thick) to let the light through		1		1		1
				Question 2 total	3	6	1	10	2	7

UNIT 5 – PRACTICAL EXAMINATION - SUMMARY OF ASSESSMENT OBJECTIVES

	Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
Experimental task	1	5	9	6	20	6	20
Practical analysis	1	5	11	4	20	10	7
	2	3	6	1	10	2	7
	Total	13	26	11	50	18	34