GCE A LEVEL MARKING SCHEME

SUMMER 2023

A LEVEL
BIOLOGY – UNIT 5
1400U50-1

INTRODUCTION

This marking scheme was used by WJEC for the 2023 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 2023 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				**Teacher awarded:** NaOH beads are correctly placed in the syringe with cotton wool on either side (1) the distance travelled in **one** time interval is marked accurately (1)		2		2		2
	(a)			**Table:** • units correct: (all needed for 1 mark) IV = s / seconds; DV = mm / millimetres Mean volume of oxygen = mm^3 (1) Accept cm^3 • all distances recorded **to nearest mm** (1) • means calculated and rounded correctly **to a max of 1 dp** more than the precision of the data (1) • mean volumes calculated correctly **to 1dp** (1) [Must match the unit] **[volume quick calculator = mean distance x 0.785]** **(if they used pi = 3.14)**	1 1	1 1		4	3	4
	(b)			**Graph:** use of more than half the graph paper **for both x and y axes** (1) labels: x axis = time [no ecf] + y axis = **mean total** volume of oxygen absorbed (by germinating mung beans) [no ecf] (1) correct units: x = s / seconds [ecf] + y = mm^3 [ecf] (1) linear scales correct on both axes with 0 at origin (1) plots correct +/- ½ small square (2) suitable line drawn including 0 (1)	1 1 1	 1 1 2		7	2	7

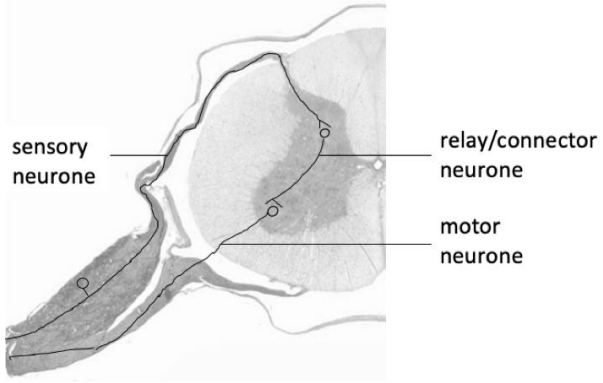
Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		**<u>Test 1 and 2</u>** Oxygen absorbed = (volume of) carbon dioxide released (during respiration) (1) **<u>Test 1</u>** Carbon dioxide absorbed by sodium hydroxide (so marker fluid moved towards the syringe) (1) **<u>Test 2</u>** Carbon dioxide not absorbed (by sodium hydroxide so marker fluid moved towards the syringe) (1)		1	1	2		2
		(ii)		{Air / oxygen} replaced in {syringe/ for mung beans} (1) To provide oxygen {needed for respiration / so respiration can continue} / so the seeds don't run out of oxygen for respiration (1)			2	2		2
		(iii)	I	Enzymes {responsible for respiration/ owtte} would be {denatured/ owtte} (1)			1	2		2
			II	Marker fluid would not move (as no respiration) (1)			1			
		(iv)		Seeds vary in {volume / mass / size} / owtte + {so different oxygen requirements**/** different rates of respiration/ Make results more comparable (if experiment repeated with different seeds)/ owtte} (1) Ignore references to reliability Reject references to accuracy/ repeatable			1	1		1
				Question Total	**5**	**9**	**6**	**20**	**5**	**20**

PRACTICAL ANALYSIS MARK SCHEME

<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks Available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td></td><td>$C_6H_8O_6$</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>One of:
<table><tr><th>Hazard</th><th>Risk</th><th>Control measure</th></tr><tr><td>(Methylene blue is an) irritant</td><td>Causes irritation to skin when {being injected /drawn into /using} syringe
OR
Causes irritation to eye when transferred from hand to eyes when {being injected/drawn into /using} syringe</td><td>Cover skin/wear gloves
OR
Wear eye protection/goggles</td></tr><tr><td>(Methylene blue is an) allergen</td><td>Causes {reaction/ owtte} if touches skin when {being injected/drawn into/using} syringe</td><td>Cover skin/wear gloves</td></tr></table>Correct hazard + risk + control measure = 1 mark</td><td></td><td>1</td><td></td><td>1</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Needle is sharp + {skin puncture/ owtte} when drawing up / injecting methylene blue
OR
veg extract is an allergen + causes {reaction/ owtte} when using syringe
Accept Methylene blue is an {irritant/ allergen} + causes reaction/ owtte} when using syringe if not given in (i)</td><td></td><td>1</td><td></td><td>1</td><td></td><td>1</td></tr>
</table>

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		{Lower volume of/less} methylene blue required (for end point) (1) Oxygen (in the air) would (re-)oxidise the methylene blue / description (1). Ignore more oxidation unqualified	1		1	2		2
	(c)			35.8		1		1	1	
	(d)	(i)		5% or less probability that any difference between the means is due to chance/ (If the null hypothesis is supported) the calculated value of t is {equal to / greater than} the critical value of t in at least 5% of cases.		1		1	1	
		(ii)		(For 2 sets of data each with 15 readings) df = $(n_1 - 1) + (n_2 - 1) = 28$/ (15-1) + (15-1)=28/ (15 + 15) -2 = 28/ Total number of samples – 2 = 28 Reject 30 – 2 unqualified		1		1	1	
	(e)	(i)		There is no significant difference (1) between the mean vitamin C concentrations ……. (1)	2			2		2
		(ii)		• The calculated value of t is greater than the critical value/ 2.527 is greater than 2.048 / ORA (1) • So the null hypothesis is rejected (1) • Fresh peas have significantly higher concentration of vitamin C than green cabbage/ there is a significant difference + peas have a higher concentration of vitamin C than green cabbage (1)		2	1	3	1	3

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(f)	(i)		Award two marks for 0.48 If incorrect award one mark for 0.475 (1) (0.46 + 0.49)/2 (1) (0.49-0.46)/2 +0.46 (1)		2		2	2	
		(ii)		Larger number of samples/ owtte	1			1	1	1
	(g)			A. Legumes have root nodules (1) B. Which contain N fixing bacteria / *Rhizobium* (1) Ignore reference to nitrifying bacteria/ Azotobacter C. Convert (atmospheric) nitrogen to ammonium (ions) (1) Ignore nitrates Reject ammonia D. Legumes use ammonium to make {nitrogen containing compounds/ named compounds} (1) Reject nitrates/ nitrites	2		2	4		
				Question 1 Total	**6**	**10**	**4**	**20**	**7**	**10**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	AO1	Maths	Prac
2	(a)	(i)		Correct label with line ending inside the central canal.		1		1		1
		(ii)		X meninges (1) Accept Dura mater Reject Pia mater Y white matter (1)		2		2		2
	(b)	(i)		Eyepiece graticule (1) Stage micrometer (1)	2			2		2
		(ii)		198 / 198.4 / 198.5 / 199 / 200 mm (2 marks) If incorrect, correct substitution (1 mark) $\frac{0.5}{12.4} = \frac{8.0}{B}$ / B = $\frac{8.0 \; x \; 12.4}{0.5}$		2		2	2	2
	(c)	(i)		Three lines labelled sensory neurone (going in through the dorsal root ganglion), relay neuron (in grey matter) and motor neurons coming out through ventral root) (1) Correct position of cell bodies (1)  		2		2		2

Question				Marking details	Marks Available					
					AO1	AO2	AO3	AO1	Maths	Prac
		(ii)		Synapse is too small (to be seen in the light microscope)/ light microscope does not have great enough {resolution/ magnification} Ignore power			1	1		1
				Question 2 Total	**2**	**7**	**1**	**10**	**2**	**10**

A2 UNIT 5 – PRACTICAL EXAMINATION – SUMMARY OF ASSESSMENT OBJECTIVES

	Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
Experimental task	**1**	5	9	6	**20**	5	20
Practical analysis	**1**	6	10	4	**20**	7	10
	2	2	7	1	**10**	2	6
	Total	**13**	**26**	**11**	**50**	**14**	**36**