



Rewarding Learning

**ADVANCED
General Certificate of Education
2025**

Biology

Assessment Unit A2 3

assessing

Practical Skills in Biology

[ABY31]

WEDNESDAY 18 JUNE, MORNING

**MARK
SCHEME**

General Marking Instructions

Introduction

The main purpose of the mark scheme is to ensure that examinations are marked accurately, consistently and fairly. The mark scheme provides examiners with an indication of the nature and range of candidates' responses likely to be worthy of credit. It also sets out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for Biology.

Candidates should be able to demonstrate:

- AO1** Knowledge and understanding of scientific ideas, processes, techniques and procedures.
- AO2** Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:
- in a theoretical context
 - in a practical context
 - when handling qualitative data
 - when handling quantitative data.
- AO3** Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:
- make judgements and reach conclusions
 - develop and refine practical design and procedures.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 17 or 18-year-old which is the age at which the majority of candidates sit their GCE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 17 or 18-year-old GCE candidate.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Marking calculations

In marking answers involving calculations, examiners should apply the 'own figure rule' so that candidates are not penalised more than once for a computational error. To avoid a candidate being penalised, marks can be awarded where correct conclusions or inferences are made from their incorrect calculations.

/ denotes alternative points

; denotes separate points

comments on mark values are given in bold

comments on marking points are given in italics

When one response is required to gain a mark, candidates will not gain credit if a correct response is given alongside one or more incorrect responses. This is referred to as listing.

			AVAILABLE MARKS	
1	(a)	X – cornea; Y – pupil;	[2]	
	(b)	Suspensory ligaments;	[1]	
	(c)	Allows light rays to pass through so they can reach the photoreceptor cells/retina;	[1]	4
2	(a)	Step 4; Step 5; Step 2;	[3]	
	(b)	There is a large amount/more DNA in strawberry cells so it is easier to extract;	[1]	4
3	(a)	Biological control organism must be a natural predator of the pest/must not be a predator of non-pest species/should be able to survive in the ecosystem/OAR;	[1]	
	(b)	(i) Exponential (growth);	[1]	
		(ii) Chemical control reduces aphid population well below untreated; They are similar in effectiveness;	[2]	
		(iii) Leaves could be of different sizes/larger leaves could hold more aphids;	[1]	5

		AVAILABLE MARKS
4	<p>(a) (i) Measure distance liquid travels over a set period of time; (using apparatus as set up in diagram to) calculate the oxygen uptake (per unit time); replace the potassium hydroxide with water and measure distance liquid travels over (the same) time; carbon dioxide produced is calculated by adding or subtracting the original distance moved using potassium hydroxide to/from distance liquid moves without potassium hydroxide; RQ value is carbon dioxide produced divided by the oxygen consumed (over same time); [5]</p> <p>(ii) Any two from:</p> <ul style="list-style-type: none"> • same peas • volume of KOH/water • temperature [2] 	
	<p>(b) The rate of respiration would fall; due to lack of oxygen available/oxygen would get used up and not replaced; [2]</p>	9
5	<p>(a) Animals are mobile/OAR (e.g. can be camouflaged/trap shy); [1]</p> <p>(b) (i) $\frac{(66 \times 110)}{33}$; 220; [2]</p> <p>(ii) The population size is underestimated; high number of recaptures/insufficient time to disperse; [2]</p> <p>(c) Life spans/territories of birds can be calculated/OAR; [1]</p>	6

- 6 (a) (Phylum) Annelida; [1]
- (b) (i) Any **two** from:
- metameric segmentation
 - bilateral symmetry
 - regional specialisation
- [2]
- (ii) Circular/round; [1]
- (c) (i) Formula used correctly;
14.4 and 12.4; [2]
- (ii) Confidence limits correctly drawn on the appropriate bar of the graph; [1]
- (iii) There is a 95% probability that the true (population) mean lies between the upper and lower limits/provides information on the variability of the data/shows if means are likely to be significantly different; [1]
- (iv)

Conclusion	Conclusion supported in...		
	...nutrient rich soil only	...nutrient poor soil only	...both nutrient rich and nutrient poor soil
Mean biomass of Annual Meadow-grass is greater with earthworms than without.			✓
Mean biomass of Lesser Trefoil is greater with earthworms than without.	✓		
Mean biomass of Annual Meadow-grass is greater than the mean biomass of Lesser Trefoil when earthworms are not present.	✓		

;;; [3]

AVAILABLE MARKS

11

			AVAILABLE MARKS	
7	(a)	<p>Any four from:</p> <ul style="list-style-type: none"> • pin the small mammal on a dissecting board • use a scalpel/forceps/other appropriate apparatus • to cut through the layers of fur/skin • fold the layers back to view separate organs <p>Or</p> <ul style="list-style-type: none"> • place a section of grass leaf on a microscope slide • add a few drops of water • slide a razor blade along the grass leaf • repeat several times (until the leaf has an almost transparent appearance) <p>Or</p> <ul style="list-style-type: none"> • (place organ) on a dissecting board; • Use a scalpel/forceps/other appropriate apparatus; • Description of how to cut the organ (from top to bottom); • Open the organ to view internal features; 	[4]	
	(b)	<p>(i) Any two from:</p> <ul style="list-style-type: none"> • place a drop of bacterial culture on to the agar • streak evenly across the agar • incubate for 24–48 hours at 21–25 °C <p>(ii) Any two from:</p> <ul style="list-style-type: none"> • flame neck of culture bottle • do not set lid down/by description • use a sterile dropper/loop to remove a microbiome sample 	[2]	
	(c)	<p>(i) Nature;</p> <p>(ii) Year of publication;</p>	[1]	
				10

			AVAILABLE MARKS	
8	(a) (i)	To have a reference point from which to measure distances/to mark where the spot began; to prevent the origin line from being dissolved by the solvent/prevent contamination by ink;	[2]	
	(ii)	Any five from: Chromatogram is attached to the lid of the tank/method of support described; bottom of paper is in the solvent and baseline is above solvent; once solvent is near the top of the chromatogram, remove from solvent mark the solvent front; measure the distance between the solvent front and baseline and between the leading edge/centre of each spot and the baseline; calculate the R_f values as distance to spot divided by distance to solvent front;	[5]	
	(iii)	Petroleum ether: 225 cm ³ and Acetone: 25 cm ³	[1]	
	(b) (i)	Carotene;	[1]	
	(ii)	More intense/concentrated spot for chlorophyll b (or converse for chlorophyll a); more intense/concentrated spot for carotene and xanthophyll;	[2]	11
Total				60