



Rewarding Learning

**General Certificate of Secondary Education
2022–2023**

**Double Award Science
Biology**

Unit B1

Higher Tier

[GDW12]

TUESDAY 16 MAY 2023, MORNING

**MARK
SCHEME**

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCSE Double Award Science.

Candidates must:

- AO1** Demonstrate knowledge and understanding of:
- scientific ideas; and
 - scientific techniques and procedures;
- AO2** Apply knowledge and understanding of and develop skills in:
- scientific ideas; and
 - scientific enquiry, techniques and procedures; and
- AO3** Analyse scientific information and ideas to:
- interpret and evaluate;
 - make judgements and draw conclusions; and
 - develop and improve experimental 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 16-year-old which is the age at which the majority of candidates sit their GCSE 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. The exception to this for GCSE Double Award Science is when examiners are marking complex calculations when the Examiners are briefed to mark by error or omission. 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 16-year-old GCSE 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 'carry error through' 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.

Types of mark schemes

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response

In deciding which level of response to award, examiners should look for the number of indicative content points in candidate responses to ensure that the answer has been written to coincide with the question. In deciding which mark within a particular level to award to any response, quality of communication will be assessed and examiners are expected to use their professional judgement.

The following guidance is provided to assist examiners.

- **Threshold performance:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- **High performance:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication

Quality of written communication is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of bands of response. The description for each band of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within bands of response as follows:

- Band A: Quality of written communication is excellent.
- Band B: Quality of written communication is good.
- Band C: Quality of written communication is basic.
- Band D: Response not worthy of credit.

In interpreting these band descriptions, examiners should refer to the more detailed guidance provided below:

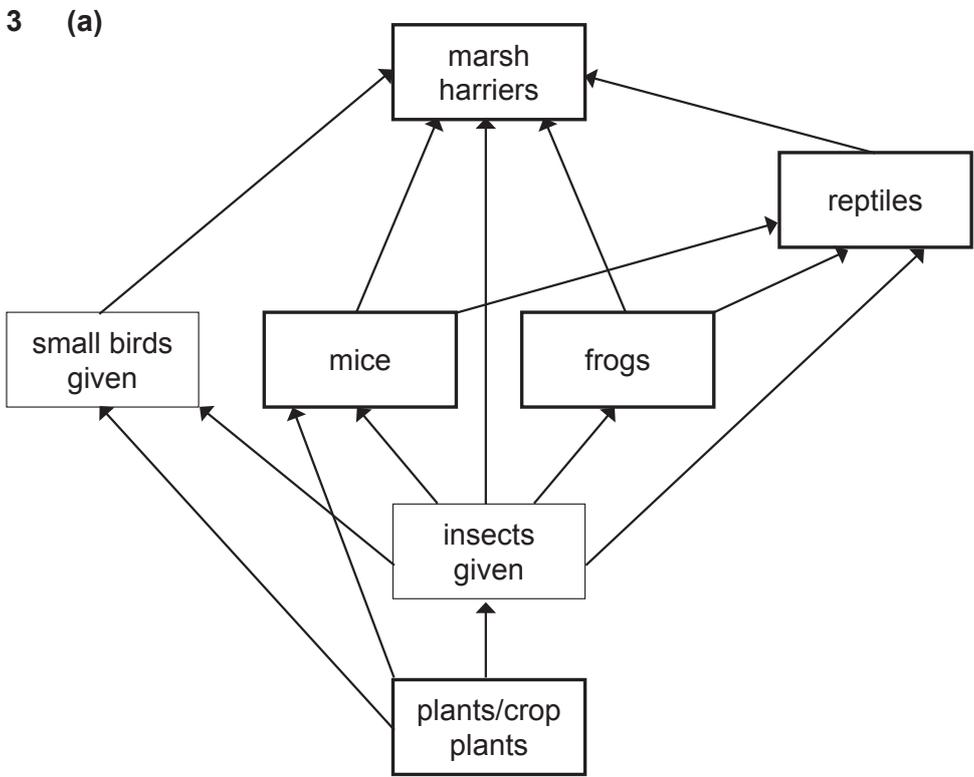
Band A (Excellent): Excellent reference to scientific terminology. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

Band B (Good): Good reference to scientific terminology. The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Band C (Basic): Basic reference to scientific terminology. The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

- 1 (a) line with extension on right hand side and forms a complete cell;
cell membrane whole way around inside of cell wall;
nucleus present in the cytoplasm/vacuole present; [3]
- (b) chloroplasts; [1]
- 2 (a) fatty acids; [1]
- (b) as temperature increases time decreases;
10 °C is 12 min, 40 °C is 5 min/7 minutes less; [2]
- (c) (i) straight line extended with same gradient; [1]
- (ii) 8 min (e.c.f. from (c)(i)) [1]
- (d) Any four from:
enzyme/lipase denatured;
shape of enzyme/shape of active site changed/enzyme not complementary to substrate;
less enzyme or less lipase able to react with substrate (fat)/fewer E/S complexes formed substrate no longer binds/fits with enzyme/lock and key doesn't fit;
fewer fatty acids molecules produced/less milk broken down/less product produced/less fat broken down;
pH did not change/ pH did not decrease/pH did not become acidic [4]

AVAILABLE MARKS	
4	
9	



- [1] mark for plants/crop plants at bottom and Marsh Harriers at the top;
[1] mark for mice frogs and reptiles correct in this order;
[1] mark for all 5 arrows to Marsh Harriers;
[1] mark for 3 arrows to reptiles from insects and frogs and mice; [4]

- (b) (i) 1286 – 302 = 984;
 984/302 × 100;
 325.8;
 326

[4]

(ii) **Indicative content**

- (no pesticides) 1. more insects;
 2. more food for marsh harriers/food linked with small birds/mice/frogs/reptiles/marsh harriers;
 3. eggs survival/ shells survival;
 4. babies/chicks/young birds/birth rate increases;
 (no drainage) 5. habitat/ nesting sites/breeding sites;
 6. qualification of habitat/nesting sites/ breeding sites/territory/home/place to live;

Band	Response	Mark
A	Candidates use appropriate terms throughout to give at least five points from the indicative content. They use good spelling, punctuation and grammar skills. Form and style are of a high standard.	[5]–[6]
B	Candidates use appropriate terms throughout to give at least three or four points from the indicative content. They use satisfactory spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
C	Candidates use appropriate terms throughout to give one or two points from the indicative content. They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

- (c) more birds to breed/reproduce/more young produced/ less birds killed/ none killed/more birds live;

[1]

15

- 4 (a) line labelled E to muscle;

[1]

- (b) spinal cord;

[1]

- (c) 2;

[1]

- (d) association/relay/intermediate/connector;

[1]

4

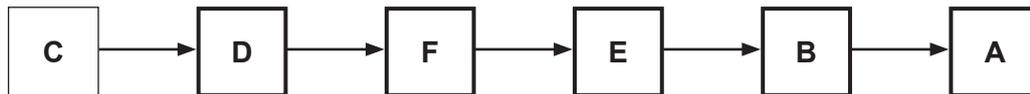
AVAILABLE
MARKS

				AVAILABLE MARKS
5	(a)	grown/bends; to left hand side/to the light;	[2]	
	(b)	(i) Expt. 1 B and D [1] each either order	[2]	
		(ii) Expt. 2 E and G [1] each either order	[2]	
		(iii) Expt. 3 C and H [1] each either order	[2]	8
6	(a)	highest temperature/higher temperature than A and D ; most oxygen/more oxygen than A, B and D; more water than B and less water than D /more water than B but not waterlogged (D)/below 32 but has sufficient water;	[3]	
	(b)	alfalfa; most nitrogen fixing bacteria/most nodules/ highest amount of nitrogen fixation; (nitrogen converted into) nitrates/nitrates present; (for crop) growth/(make) amino acids/(make) protein;	[4]	7
7	(a)	(i) water/H ₂ O;	[1]	
		(ii) ethanol/alcohol;	[1]	
	(b)	(i) red; yellow; (in that order) [1] each	[2]	
		(ii) more carbon dioxide; respiration faster;	[2]	
		(iii) no gas/no carbon dioxide produced/no bubbles;	[1]	
		(iv) no glucose left/all the glucose used up;	[1]	
	(c)	lactic acid (+ energy);	[1]	9

8 (a) Any **two** from:
 fertiliser;
 sewage/human waste/faeces;
 silage;
 slurry;
 manure/animal waste;
 farmyard washings / milk [2]

(b) (i) algae/plants; [1]

(ii)



(given)

[1] mark for **D** in 2nd box;
 [1] mark for **E** and **F** in either order in 3rd and 4th boxes – i.e. **E** then **F**
 or **F** then **E**;
 [1] mark for **B** then **A** in last two boxes; [3]

(c) quicker recovery of river;
 rain water more dilution/more oxygen in river;
 allow converse [2]

9 (a) no chlorophyll/no chloroplasts (to trap light);
 no photosynthesis; [2]

(b) 1 allow A
 3 allow C
 4 allow D
 2 allow B
 in this order under each other
 1 at top and 2 at the bottom = [1] mark
 3 on second line and 4 on third line = [1] mark [2]

(c) (i) **B**; [1]

(ii) highest rate of photosynthesis/ fastest photosynthesis/
 photosynthesis will be greater than respiration earlier/
 carbon dioxide taken in will be greater than carbon dioxide
 given out earliest; [1]

Total

AVAILABLE MARKS	
	8
	6
	70