



*Rewarding Learning*

**General Certificate of Secondary Education  
2023–2024**

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**Double Award Science  
Biology**

Unit B1

Higher Tier

**[GDW12]**

**MONDAY 13 NOVEMBER 2023, MORNING**

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**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.

			AVAILABLE MARKS
1	(a) energy flow/transfer	[1]	
	(b) 2	[1]	
	(c) (i) $106 \times 115 = 12\,190$ ; $12\,190 \div 46 / 12\,190 \div (115 - 69)$ ; 265	[3]	
	(ii) Thrushes will see the snails and eat them/higher chance of predation/ more visible	[1]	
	(d) Description: number of snails increases/is going up/rises; (after 50 cm) number of snails remains same/levels off/remains at 8  Reasons: Any <b>two</b> from: people trample the plants (close to pathway) people trample the snails (close to pathway) less food for the snails/less plants for the snails (allow converse for further away from the pathway)	[4]	10

2 (a) (i) Any **two** from:  
 complex carbohydrate contains glucose;  
 carbohydrate digested/broken down (into glucose);  
 absorbed into blood/diffused into the blood. [2]

(ii) A – pancreas [1]

(b) Any **two** from:  
 less respiration;  
 glycogen converted to glucose;  
 less uptake of glucose;  
 liver releases glucose into the blood/liver produces more glucose [2]

(c)

Statement	Only true for Type 1 diabetes	Only true for Type 2 diabetes	True for both Type 1 and Type 2 diabetes
Thirst is a symptom			✓
<b>Always</b> treated with insulin	✓		
Usually occurs later in life		✓	
Heart disease is long term complication			✓
Linked to obesity		✓	

[5]

(d)  $99\,833 - 88\,305 = 11\,528$ ;  
 $11\,528 \div 88\,305 \times 100$ ;  
 13.0547;  
 Rounded to 13.1 [4]

14

### 3 Indicative content

1. saprophytic
2. bacteria/fungi
3. enzymes/extracellular enzymes/secrete enzymes
4. (enzymes carry out) digestion/breakdown
5. minerals/nutrients/products taken up by the bacteria/fungi/microorganisms/soil
6. formation of humus
7. Any **one** from:
  - higher temperature increases rate of decomposition/too warm decreases the rate of decomposition
  - moisture increases rate of decomposition
  - oxygen increases rate of decomposition
  - pH too acidic/too alkaline decreases the rate of decomposition
 Allow converse for point 7

Must have point 7 to get into top band

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

[6]

6

- 4 (a) arrow on left hand side of diagram pointing towards tip of shoot [1]
- (b) phototropism [1]
- (c) hormone [1]
- (d) (more) auxin/hormone on shaded side;  
(more) **cell** elongation on shaded side [2]

5

AVAILABLE  
MARKS

			AVAILABLE MARKS	
<b>5</b>	<b>(a) (i)</b>	1. sensory (neurone);		
		2. association/connector/relay (neurone);		
		3. motor (neurone);		
		4. effector/muscle	[4]	
<b>(b) (i)</b>	synapse;		[1]	
	<b>(ii)</b> 2		[1]	
<b>(c)</b>	any response that requires thought, e.g. taking off a jumper; slower;			9
	involves the brain/conscious thought		[3]	
	(allow converse providing that reflex is stated)			
<b>6</b>	<b>(a)</b>	<b>A</b> – denitrification		
		<b>B</b> – nitrogen fixation		
		<b>C</b> – decomposition/decay	[3]	
	<b>(b)</b> <b>X</b> indicating denitrification (on the line labelled <b>A</b> )	[1]		
<b>(c) (i)</b>	root hair		[1]	
	<b>(ii)</b> cell membrane		[1]	
	<b>(iii)</b> carry out respiration/site of respiration		[1]	
<b>(d)</b>	2; 4; 7; (any order)		[3]	10
<b>7</b>	<b>(a)</b>	line rises by B at the latest;		
		peaks at or between B and C;		
		decreases to any level after peak	[3]	
<b>(b) (i)</b>	(algae have died due to) lack of nitrates/nitrate depletion; shading/described			[2]
	<b>(ii)</b>	bacteria/fungi/decomposers (not microorganisms on its own)		[1]
<b>(c)</b>	decrease		[1]	7

8 (a)

Time	Colour of hydrogencarbonate indicator	Level of carbon dioxide in the fish tank
2 am (night)	Yellow	high
10 am	Red	normal
2 pm (afternoon)	Purple	low

all three correct = [2] marks

1 correct = [1] mark

[2]

(b) (i) fish carry out respiration (only);  
fish produce/give out carbon dioxide  
(Don't credit high carbon dioxide level as in question)

[2]

(ii) Any **two** from:  
(Pondweed carries out) photosynthesis;  
more photosynthesis than respiration;  
more carbon dioxide taken in than given out.

[2]

(c)

Change	2 pm (afternoon) effect on the amount of		2 am (night) effect on the amount of	
	photosynthesis	respiration	photosynthesis	respiration
Adding two more fish	no change		no change	increase
Adding four more pieces of pondweed		increase	no change	increase

1st two columns correct;

3rd column correct;

4th column correct

[3]

**Total**

AVAILABLE  
MARKS

9

**70**