



Rewarding Learning

**General Certificate of Secondary Education
2019–2020**

**Double Award Science
Biology**

Unit B1

Foundation Tier

[GDW11]

WEDNESDAY 6 NOVEMBER 2019, 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) Letter	Structure	AVAILABLE MARKS
	W	plasmid	
	X	cell wall	
	Y	chloroplast	
	Z	cell membrane	
		cytoplasm	
		genetic material	
	[1] for 1 correct, [2] for 2 correct, and [3] for 3 or 4 correct		[3]
	(b) not made of cellulose in the bacterial cell/plant cell wall made of cellulose (no reference to bacterium ok)/it is not made of cellulose		[1]
			4
2	(a) Top boxes (either order): carbon dioxide/CO ₂ ; water/H ₂ O; Bottom box: oxygen/O ₂ ;		[3]
	(b) Any two from: • respiration/produce energy/chemical energy/food for energy/energy store energy; • storage (make/produce/store) oils/glycerol/fatty acids/starch/cellulose/chlorophyll/protein/amino acids/sucrose; Accept 2 substances named		[2]
			5
3	(a) Cells/cell; Organ(s) ignore named organ if with word organ		[2]
	(b) (i) Renal artery		[1]
	(ii) Ureter		[1]
	(iii) Store urine/holds urine/keeps urine/stores urea		[1]
	(iv) D		[1]
			6

- 4 (a) (i) Habitat [1]
- (ii) Community [1]
- (b) (i) Sun/sunlight/light [1]
- (ii) (Trophic level) 3/three/third/tertiary [1]
- (iii) Mark description and explanation together
Description: Increase/more owls alive/produce more owls/produce more offspring
- Any **two** from:
- owls eat or have:
more food
more rats (for owl to eat)/owls have more prey
more beetles (for owl to eat)
more rabbits (for owls to eat);
 - less** competition (for food)/foxes and owls eat same food as owls/
there is one less predator/won't have to fight over animals
 - foxes eat less food/animals/foxes eat less rats/foxes eat less
rabbits/foxes eat less beetles/or less rats eaten by foxes/less
rabbits eaten by the foxes/less beetles eaten by foxes [3]

AVAILABLE
MARKS

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5 (a)

Statement	Correct	Incorrect	Cannot tell from data
As a male patient's weight increases the chance of being diagnosed with Type 2 diabetes decreases.		✓	
The percentage of female patients diagnosed with Type 2 diabetes is the same in the underweight and healthy weight categories.	✓		
As male patients get older there is a greater chance of being diagnosed with Type 2 diabetes.			✓
No underweight female patients were diagnosed with diabetes.		✓	
In each weight category, the percentage of male patients diagnosed with diabetes is greater compared to female patients.		✓	

[1] per correct row 1 correct tick per row [5]

- (b) (i) $126 \div 100 \times 5$;
6.3;
119.7 (kg) 120 worth [2] [3]
- (ii) 50% [1]

9

6 (a) Any **two** sets from:

AVAILABLE
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A **Description**

thin walls/thin cells/2 layers of cells/2 cells/no gaps between air sacs and capillaries/air sac (alveolus) close to transport system;

Explanation

short or smaller **diffusion** pathway/better/easier **diffusion**/more O₂ **diffuses**/more CO₂ **diffuses**/short diffusion distance

B **Description**

good blood supply/lots of capillaries/dense capillary network/rich blood supply

Explanation

maintain diffusion gradient/takes oxygen away **quickly**/faster/brings CO₂ **quickly**/faster

C **Description**

Layer of moisture present/air sac has a layer of moisture; moist walls

Explanation

gases/oxygen or CO₂ **dissolve** in the moisture/water

D **Description**

Large surface **area**

Explanation

more diffusion/**increased** diffusion/**max** diffusion/**more** O₂/**more** CO₂ across or **more/increased/max** gas exchange
allow more **room**/lots of **space**/for gas exchange

E **Description**

Permeable

Explanation

to allow gases/allow oxygen/carbon dioxide **through/across/transfer** in or out/**easier** for gases to get in or out [4]

(b) (i) Explanation any **two** from: (assume C)

- lowest breathing rate **at rest**/lower than A and B **at rest**;
- lowest breathing rate **after exercise**/lower than A and B **after exercise**;
- least time for breathing rate to **return to at rest value**/normal value/shortest **recovery** time
- least increase in breathing rate (after exercise)
- lowest breathing rate at **all times** = [1]

Or award if they give values shown below:

- Breathing rate at rest is 2 breaths less than student A and 3 breaths less than student B
- Breathing rate after exercise is 5 breaths less than student A and 8 breaths less than student B
- A increases by 21 and B increases by 23 or C **only** increases by 18
- Time taken to return to breathing rate at rest is 2 minutes faster than student A and 3 minutes faster than student B. [2]

- (ii) Any **two** from:
- **more** oxygen (taken in)/**more** carbon dioxide removed/oxygen taken in **faster**;
 - for **more** respiration/**increased** respiration/faster respiration;
 - for **more** energy/**increased** energy;
 - for **more** muscles contraction/muscles to work **more**/muscles more **efficient**/for muscles to work **better**; [2]
- (c) (i) No oxygen/lack of oxygen/not enough oxygen/anaerobic is without O₂; not enough energy from aerobic respiration/gives you energy/you need energy/happens when we run out of energy and need more [2]
- (ii) Lactic acid/lactate [1]

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- 7 (a) Mark description and explanation together
- Description:** **Some** protein stain removed/large amount of protein remaining/10% removed/90% remaining/**little** stain removed/**most** stain remaining
- Explanation:** Any **three** from:
- Shape of active site changed
 - Substrate cannot fit/not **complementary**/doesn't fit like lock and key
 - no E-S complexes formed/less **successful** collisions
 - pH is (too) acidic/pH far from optimum/pH is too low [4]
- (b) (pH) 9;
No stain remaining/all stain removed/100% stain removed/0% stain remaining/takes all stain [2]
- (c) Temperature/heat//enzyme conc./substrate (protease concentration) conc./time [1]
- (d) Amino acids [1]
- (e) Lipase [1]
- (f) (i) Molecule C [1]
- (ii) Lock and Key [1]

AVAILABLE
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8 Indicative content:

1. (Leaves contain) chloroplasts/chlorophyll
2. Palisade mesophyll cells contain **many** chloroplasts
3. Palisade mesophyll cells tightly packed/near upper surface of the leaf/elongated/lengthways/90°
4. **Spongy** (mesophyll) cells contain chloroplasts/chlorophyll/contain some chloroplasts/less chloroplasts than palisade cells
5. Thin/transparent/clear cuticle
6. Epidermis lacks chloroplasts/thin/transparent/clear/one cell thick
7. Allows light to enter/not obstructed – **linked to 5. or 6.**
8. Large surface area (of leaf)
9. Short distance between upper and lower surfaces/leaf is thin

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]

(b) stomata/stoma

[1]

Total

**AVAILABLE
MARKS**

7

60