



**General Certificate of Secondary Education  
2022**

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# **Biology**

Unit 2

Higher Tier

**[GBL22]**

**WEDNESDAY 15 JUNE, 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 Biology.

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; 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. 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 'own figure rule' so that candidates are not penalised more than once for a computational error.

### **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**

Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the 'best fit' bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, 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.

**Intermediate performance:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle 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 levels of response. The description for each level 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.

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


**Band A (Excellent):** 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):** 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):** 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.

### **COVID-19 Context**

Given the unprecedented circumstances presented by the COVID-19 public health crisis, senior examiners, under the instruction of CCEA awarding organisation, are required to train assistant examiners to apply the mark scheme in case of disrupted learning and lost teaching time. The interpretation and intended application of the mark scheme for this examination series will be communicated through the standardising meeting by the Chief or Principal Examiner and will be monitored through the supervision period. This paragraph will apply to examination series in 2021–2022 only.

			AVAILABLE MARKS	
1	(a)	(i) Antigen;	[1]	12
		(ii) So they do not cause the disease; but still contain antigens/stimulate antibodies/can be recognized by white blood cells;	[2]	
		(iii) Active;	[1]	
		(iv) Lymphocyte;	[1]	
		(v) Circle drawn round middle diagram  ;	[1]	
		(vi) Antibodies have complementary shape; Attach to antigen/protein/virus; cause clumping; prevent it spreading/reproducing; <i>any 3</i>	[3]	
1	(b)	(i) Different shape of protein/antigen; fewer proteins/antigens;	[2]	12
		(ii) Previous antibodies will not fit/attach/wrong shape /not complementary	[1]	
2	(a)	Gene – part of chromosome that codes for a characteristic; Allele – different form of a gene/dominant or recessive;	[2]	7
		(b) (i) All the genetic material of an organism;	[1]	
	(ii) Bacteria;	[1]		
	(iii) Mammals;	[1]		
	(iv) Mammals/insects; mammals bigger than insects but some have smaller genome; <b>or</b> insects have a larger genome than mammals, but are smaller organisms;	[2]		
3	(a)	(i) Red blood cell; for carrying oxygen;	[2]	10
		(ii) biconcave/no nucleus/contains haemoglobin;	[1]	
		(iii) B – plasma; carbon dioxide;	[2]	
	(b)	(i) Platelets;	[1]	
		(ii) Fibrinogen; converted to fibrin; red blood cells trapped/mesh forms;	[3]	
		(iii) Stop bleeding/prevent infection;	[1]	

			AVAILABLE MARKS	
4	(a) (i)	Ovary;	[1]	7
	(ii)	Progesterone;	[1]	
	(b) (i)	Female A: 200 to 440; Female B: 40 to 140;	[2]	
	(ii)	Oestrogen level is low; unable to release eggs/no ovulation;	[2]	
	(iii)	IVF/hormone injections;	[1]	
5	(a)	Evaporation; from spongy mesophyll cells; Diffusion; through stomata; <i>any 3</i>	[3]	10
	(b)	Guard cell;	[1]	
	(c) (i)	Least total number of stomata; appropriate data/154; high temperatures speed up the rate of transpiration/conserve water in hot climates;	[3]	
	(ii)	Species B; stomata only found on upper surface of the leaf; to facilitate gas exchange/described;	[3]	
6	(a) (i)	C; two divisions; 4 cells produced;	[3]	9
	(ii)	Testes;	[1]	
	(iii)	Independent Assortment;	[1]	
	(b) (i)	6;	[1]	
	(ii)	60;	[1]	
	(iii)	Any <b>two</b> from: growth; repair; asexual reproduction;	[2]	

			AVAILABLE MARKS																			
7	(a)	(i) A – vein; B – artery;	[2]	8																		
		(ii) A – thin wall, B – thick wall; A – large lumen, B – small lumen; N.B. comparison needed.	[2]																			
	(b)	(i) Slows down; arteries blood is under high pressure/closer to heart/capillaries further from heart/capillaries have smaller lumen;	[2]																			
		(ii) Allow <u>more</u> time; for diffusion;	[2]																			
8	(a)	(i) Differences (between individuals); within the <u>same</u> species/population;	[2]	9																		
		(ii) Discontinuous/discrete;	[1]																			
		(iii) B and E; ( <b>Need both</b> )	[1]																			
	(b)	(i) $7 - 24 = -17$ (insist on minus or decrease once); dividing $-17$ by $24$ and multiplying by $100$ ; $= -70.83$ ; $= -71$ (to 2 sig fig);	[4]																			
		(ii) Increasing nitrate in soil causes fewer nodules per plant;	[1]																			
9	(a) Test cross;	[1]																				
	(b)	<table border="1" style="margin-bottom: 10px;"> <tr><td style="background-color: #cccccc;"></td><td>b</td><td>b</td></tr> <tr><td>B</td><td>Bb</td><td>Bb</td></tr> <tr><td>B</td><td>Bb</td><td>Bb</td></tr> </table> <table border="1"> <tr><td style="background-color: #cccccc;"></td><td>b</td><td>b</td></tr> <tr><td>B</td><td>Bb</td><td>Bb</td></tr> <tr><td>b</td><td>bb</td><td>bb</td></tr> </table>		b	b	B	Bb	Bb	B	Bb	Bb		b	b	B	Bb	Bb	b	bb	bb		
	b	b																				
B	Bb	Bb																				
B	Bb	Bb																				
	b	b																				
B	Bb	Bb																				
b	bb	bb																				
		[2] marks: correct black dog genotypes/BB and Bb [2] marks: [1] for each correctly filled in Punnett square	[4]																			
	(c) If all the pups are black the dog is homozygous/BB; if any/half the pups are brown the dog is heterozygous/Bb;	[2]		7																		

- 10 (a)** Any **three** from:  
 double helix;  
 sugar;  
 phosphate backbone;  
 base-pairing; [4]
- (b)** Different sequence of bases; [1]
- (c) Indicative Content**
1. UV radiation;
  2. Mutation;
  3. Bases changed/G changes to C;
  4. Valine instead of leucine;
  5. Changes DNA code;
  6. Final protein different/non-functional;

Band	Response	Mark
A	Candidates <b>must use appropriate, specialist terms</b> throughout to describe and explain their conclusions <b>using at least 5 of the points</b> . They use <b>good</b> spelling, punctuation and grammar and the form and style are of a <b>high</b> standard.	[5]–[6]
B	Candidates use <b>some appropriate, specialist terms</b> throughout to describe and explain their conclusions <b>using at least 3 of the points</b> . They use <b>satisfactory</b> spelling, punctuation and grammar and the form and style are of a <b>satisfactory</b> standard.	[3]–[4]
C	Candidates make <b>little use of specialist terms</b> throughout to describe and explain their conclusions <b>using at least 1 of the points</b> . The spelling, punctuation and grammar, form and style are of a <b>limited</b> standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

**Total**

**AVAILABLE  
MARKS**

11

**90**