



**General Certificate of Secondary Education  
2022**

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**Single Award Science:  
Biology**

Unit 1

Higher Tier

**[GSA12]**

**WEDNESDAY 23 FEBRUARY 2022, 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 Single Award Science

Candidates must:

- AO1** Demonstrate knowledge and understanding of scientific ideas, scientific techniques and procedures;
- AO2** Apply knowledge, skills and understanding of scientific ideas, scientific enquiry, techniques and procedures; and
- AO3** Analyse information and ideas to interpret and evaluate; make judgements and draw conclusions; 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.

### **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)	Any <b>two</b> from:		
		<ul style="list-style-type: none"> <li>• Same volume (amount) of water;</li> <li>• Same mass of food;</li> <li>• Same distance of burning food from test tube;</li> </ul>	[2]	
	(ii)	Lost to the surroundings	[1]	
	(b) (i)	2300 kJ	[1]	
	(ii)	150/750 [1] 0.2 × 100 = 20% [1] [2] marks for correct answer only	[2]	
	(c) A	– contains less <b>energy/kJ</b>	[1]	
2	(a)	Any <b>two</b> from:		
		<ul style="list-style-type: none"> <li>• Chemical messengers</li> <li>• produced by glands</li> <li>• travel in the blood</li> <li>• to a target organ</li> </ul>	[2]	
	(b) (i)	5 correct points [2] 4 correct points [1] Line (ruler used to join points) [1]	[3]	
		(ii)	Increase to <b>age 12</b> [1] then decrease [1]	[2]
		(iii)	Male hormones reach peak at age 14/older than females [1] female hormone level is higher than males from age 10–13 years [1]	[2]
				7
			9	

### 3 Indicative content

- discontinuous
- distinct groups/individuals clearly divided into two or more groups
- tongue rolling/hand dominance/blood group (or other correct)
- displayed on bar chart
  
- continuous
- a gradual change in a characteristic across a population/many possible values
- height/weight (or other correct)
- displayed on a histogram

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe variation using <b>six, seven or eight</b> points above in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates must use appropriate specialist terms throughout to describe variation using <b>three, four or five</b> points above in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe variation using <b>one or two</b> of the points above. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

6

AVAILABLE  
MARKS

- 4 (a) (i) Floating pennywort grows up to 20 cm a day/spreads rapidly [1]  
giant hogweed produces thousands of seeds every year/reproduces rapidly [1] [2]
- (ii) Decreases biodiversity [1]
- (b) (i) Increases biodiversity [1]  
protects habitats/rare species [1] [2]
- (ii) A site that has previously had buildings/housing [1]

- 5 (a) (i) The alleles of a gene are different [1]

(ii)

	F	f
f	Ff	ff
f	Ff	ff

Gametes [1]

Offspring [1] [2]

- (iii) 50% [1]

- (b) Gene is short section of a chromosome/DNA [1]  
that codes for a characteristic/trait [1] [2]

- 6 (a) (i) Paul's garden – more competition/Linda's garden less competition [1]

Any **two** from:

- for space
- light
- water
- nutrients [2] [3]

- (ii) As planting density increases, the mass/size of the plants/onions decreases [1]

(b) Any **two** from:

- same garden
- equal sized areas
- same variety of onions
- left for the same amount of time [2]

AVAILABLE  
MARKS

6

6

6

			AVAILABLE MARKS	
7	(a) (i)	Endothermic	[1]	
	(ii)	$6\text{CO}_2 + \boxed{6\text{H}_2\text{O}} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \boxed{6\text{O}_2}$	[2]	
	(b) (i)	To remove all the starch/to ensure that only starch made in the investigation is tested	[1]	
	(ii)	For comparison/to show the effect of light	[1]	
	(c) (i)	Stopwatch	[1]	
	(ii)	As the light intensity increases, the rate of photosynthesis increases [1] up to <b>18.5/20 units</b> when it levels off/stops increasing [1]	[2]	
	(iii)	More photosynthesis/more growth	[1]	9
8	(a)	Change [1] in structure or number of genes/chromosomes/DNA [1]	[2]	
	(b) (i)	Population will increase	[1]	
	(ii)	Resistant bacteria (are better adapted to) survive [1] and reproduce [1] pass (resistant) <b>genes</b> onto the next generation [1]	[3]	
	(c) (i)	(Theory of) Evolution	[1]	
	(ii)	The remains of dead plants and animals preserved (in rock) [1] over millions of years [1]	[2]	
	(iii)	Fossils can be dated [1] and compared to see changes over time [1]	[2]	11
			<b>Total</b>	<b>60</b>