



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

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**Single Award Science:  
Biology**

**Unit 1**

**Higher Tier**

**[GSA12]**

**TUESDAY 16 MAY 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 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.

- 1 (a) (i) Gradual change in a characteristic across a population [1]  
(**not** can be shown on a histogram – does not explain term) [1]
- (ii) Weight/hand span/length of foot (**not** shoe size) [1]
- (b) Genetic/environmental [1]
- (c) (i) Histogram [1]
- (ii) 61 and 75 m [1]
- (iii) Any value between 91 and 105 m [1]

AVAILABLE  
MARKS

6

2 (a) Indicative content:

- egg and sperm
- fuse/join
- oviduct
- to form a zygote
- zygote divides many times to form a ball of cells
- it travels (down the oviduct) to the uterus
- implants into the uterus lining
- placenta allows nutrients/oxygen to pass from mother to foetus
- urea/waste/carbon dioxide to pass from foetus to mother
- the amniotic fluid cushions the foetus

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the development of the foetus using <b>at least seven</b> of the 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 use some appropriate specialist terms throughout to describe the development of the foetus using <b>four to six</b> of the 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 partially describe the development of the foetus using <b>one to three</b> of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and the form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

- (b) Alcohol harms the developing baby [1]

7

- 3 (a) The number of sheep decreases until 1950/to 2.3 million [1]  
and then increases until 2000/up to 7.5 million [1] [2]
- (b) (i) Biodiversity is the number of **different** species/range of species [1]  
in an area [1] [2]
- (ii) Replant hedgerows [1]  
leave one field or part of a field fenced off/allow the sheep to graze on  
part of the land [1] [2]
- (iii) It outcompetes native species (and so reduces the number of  
species) [1]  
spreads/reproduces rapidly (and so reduces the number of  
species) [1] [2]
- 4 (a)  $6\text{H}_2\text{O}$  [1]  
 $\text{C}_6\text{H}_{12}\text{O}_6$  [1] [2]
- (b) (i) Chloroplasts [1]
- (ii) To absorb light [1]
- 5 (a) Different form of a gene [1]
- (b) (i)
- |   |    |    |
|---|----|----|
|   | G  | g  |
| G | GG | Gg |
| g | Gg | gg |
- Gametes both G g [1]  
offspring [1] [2]
- (ii) 25% [1]
- (iii) Punnett square [1]
- (c) Changes;  
in the genes/chromosomes/DNA [2]
- (d) (i) UV light [1]
- (ii) 5 points plotted correctly [2]  
4 points plotted correctly [1]  
line drawn dot to dot with a ruler [1] [3]
- (iii)  $20 \div 30 \times 100$  [1]  
66.67% [1]  
66.7% [1] [3]

AVAILABLE  
MARKS

8

4

14

- |          |            |              |                                  |     |
|----------|------------|--------------|----------------------------------|-----|
| <b>6</b> | <b>(a)</b> | <b>(i)</b>   | <b>X</b> – Sensory neurone [1]   |     |
|          |            |              | <b>Y</b> – Motor neurone [1]     | [2] |
|          |            | <b>(ii)</b>  | Spinal cord ( <b>not</b> spine)  | [1] |
|          |            | <b>(iii)</b> | Synapse                          | [1] |
|          | <b>(b)</b> | <b>(i)</b>   | 54 arbitrary units               | [1] |
|          |            | <b>(ii)</b>  | Trend line extrapolated to 40 °C | [1] |

(c) (i)	Nervous system	Hormonal system
Type of message	electrical	chemical [1]
How message travels	neurone	blood [1]

- (ii) Auxin [1]

- 7 (a) (Gradual) changes in a species [1]  
over time/that may result in a new species [1] [2]
- (b) (Charles) Darwin [1]
- (c) Fewer mushrooms are eaten/more mushrooms survive [1]  
and reproduce [1]  
and pass on their genes [1] [3]
- (d) It is possible to date the age of a fossil to show changes over time [1]

- 8 (a) Modification [1]  
of an organisms genome [1] [2]
- (b) Any **two** from:  
• unforeseen outcomes  
• genes may spread into the wild  
• moral issues [2]
- (c) **Human** insulin can be produced/fewer side effects as **human** insulin is produced [1]

Total