



Rewarding Learning

General Certificate of Secondary Education

Single Award Science

Unit 4

Booklet B

Higher Tier

[GSA44]

Assessment

**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.

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 levels of response as follows:

Level 1: Quality of written communication is basic.

Level 2: Quality of written communication is good.

Level 3: Quality of written communication is excellent.

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

Level 1 (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.

Level 2 (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.

Level 3 (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.

General marking guidance for GCSE SA Science – Unit 4 Practical Skills

1. Alternative responses

- A solidus (/) used in mark schemes indicates alternative answers. Where a solidus may be confused with part of the answer (for example as a division sign or as part of units) “or” may be used to show alternatives.

Example: Why is it good practice to focus using a low magnification first and then increase to a higher magnification? [1]

MS: To have a wider field of view/to see more cells/to see more of the sample [1]

- Either answer as a response would be acceptable. If both are given this is accepted.

2. Brackets in a response

- Normal parentheses used in a response means that a term is **not required** for the response to be marked correct.

Example: Name the reagent X that is used to test for starch in step 5. [1]

MS: Iodine (solution) [1]

- The term ‘solution’ is not required to gain credit for this response.

3. Bolding in a response

- If part of a mark scheme response is in **bold** this is an essential word or phrase needed to gain credit for the response.

Example: Why is it not important that the starting temperature is the same for each reaction? [1]

MS: The student is measuring the **change** in temperature [1]

4. Marking of spelling

- Where candidates give an incorrectly spelt response, credit can be given if the word is recognisable phonetically and cannot be confused with another word.

Example: Name the part of the cell where photosynthesis takes place. [1]

MS: Chloroplast [1]

Response	Candidate Response	Marks awarded	Notes
1	chloroplast	1	Correct response
2	chloroplasm	0	Incorrect response – may be confused with cytoplasm
3	chlorplast	1	Correct response – phonetic spelling
4	cytoplast	0	Incorrect response – may be confused with cytoplasm

5. Marking of lists

- Where candidates give extra responses, additional correct responses can be ignored.
- Additional neutral responses can also be ignored. A neutral response is one which does not have a bearing on the question but is not incorrect.
- Additional incorrect responses **cancel out** a correct response to the marking point to which they pertain.

Example: Name one disease caused by tar. [1]

MS: Lung cancer/emphysema/bronchitis. [1]

Response	Candidate Response	Marks awarded	Notes
1	cancer	0	incorrect answer – too vague
2	lung cancer and bronchitis	1	both correct responses
3	emphysema (lung disease)	1	lung disease is a neutral answer
4	lung and stomach cancer	0	stomach cancer is not a correct answer

6. Marking of responses – ‘Choose from’

- Where candidates choose extra responses from a list of prompts, additional responses **cannot** be ignored.
- Additional incorrect responses **cancel out** a correct response to the marking point to which they pertain.

Example: Circle two parts found only in plant cells.

cytoplasm : cell wall : nucleus : chloroplast [2]

MS: cell wall and chloroplast [2]

Response	Candidate Response	Marks awarded	Notes
1	cytoplasm and cell wall	1	cell wall is correct response
2	cytoplasm and cell wall and nucleus	0	both cytoplasm and nucleus are incorrect

7. QWC

- Quality of written communication is marked using indicative content and a banded mark scheme.
- The initial marking is for the indicative content. The number of indicative content marks places a candidate in a specific band. The overall marks awarded should be in that band based on the standard of the written communication.
- A typical banded grid from a mark scheme is shown below:

Band	Response	Mark
A	Candidates must use appropriate specialist terms including a minimum of 7 points of indicative content. 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 including a minimum of 5 points of indicative content. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates provide a brief and partial response including a minimum of 2 points of indicative content. They use limited spelling, punctuation and grammar and they have made little use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

- A candidate who provides 5 indicative content points is placed in band B and can be awarded 3 or 4 overall marks out of 6 for their response.
- Responses would only be given the lower mark in the band if there were multiple spelling, punctuation and grammar errors.

8. Marking calculations

- Any errors a candidate makes in a single calculation or between parts of a multipart calculation may be carried forward to calculate the final answer, thus giving partial credit for the calculation method. ECF may be used to indicate where an error is carried forward.
- Full marks can be awarded for a correct numerical answer to any calculation even if no working out is shown.
- Units are required where they are not provided at the end of an answer line.

9. Colours and colour changes

- The colours and colour changes are given in the mark schemes. Shades (such as light and dark) are ignored except where they are clearly part of the mark scheme.
- Incorrect colours with the correct colour will lose the mark as this is an example of listing.

10. Marking diagrams

- Diagrams of apparatus are expected to be two-dimensional cross-sectional diagrams of the apparatus where appropriate.
- The marks awarded for an apparatus diagram are usually based on 1 mark being awarded to each label of a recognisable piece of apparatus in an assembled diagram.
- **No labels = no marks.**
- In some diagrams a combination of pieces of apparatus are worth 1 mark such as a gauze on a tripod with a Bunsen burner/heat. All must be recognisable in a diagram of assembled apparatus and labelled correctly for the combined mark to be awarded.

Section A – Biology

			AVAILABLE MARKS
1	(a) (i) A	[1]	5
	(ii) To have a wider field of view/to see more cells/to see more of the sample	[1]	
	(iii) 7	[1]	
	(b) (i) To show parts of the cell (more) clearly to make cell parts easier to see	[1]	
	(ii) To stop the cells drying out Do not accept to protect the cells/sample	[1]	
2	(a) The exercises are not the same [1] the times are not the same [1] (Do not accept different students are doing the exercise)	[2]	6
	(b) (i) All points plotted correctly [2] (5 points plotted correctly [1]) line of best fit [1]	[3]	
	(ii) As the time increases, the pulse rate increases Accept a converse statement Do not accept more exercise increases the pulse rate	[1]	
3	(a) To kill the leaf/stop any further reactions	[1]	12
	(b) Use a water bath	[1]	
	(c) Iodine (solution)	[1]	
	(d) (i) Correct shading of outside of the leaf	[1]	
	(ii) Chlorophyll is required for photosynthesis	[1]	
	(e) (i) Move the lamp towards the plant	[1]	
	(ii) Bubbles produced too quickly/too many bubbles to count easily/ bubbles different sizes [1] Use a measuring cylinder/measure the volume of gas/use a gas syringe [1]	[2]	
	(iii) Oxygen	[1]	
	(f) (i) A temperature of 30°C and a light intensity of 6 and a carbon dioxide concentration of 0.06% (all 3 figures must be quoted)	[1]	
	(ii) No effect	[1]	
	(iii) Carbon dioxide concentration	[1]	
Section A			23

Section B – Chemistry

			AVAILABLE MARKS
4	(a) Evaporating dish/basin [1] tripod [1] [2] (b) (i) Too much water/water above the baseline [1] (ii) B [1]		4
5	(a) C D B A [2] Any two consecutive letters in the correct order [1], e.g. DBCA gains [1] because DB are in the correct order (b) There is a larger volume of acid in test tube A/the test tubes don't have the same volume of acid [1] (c) Hydrogen [1] (d) (i) The student is measuring the change in temperature [1] (ii) 84°C [1] (iii) Bar graph/bar chart [1]		7
6	(a) (i) 33cm³ [1] (ii) Y [1] (b) The more concentrated the acid, the faster the reaction Accept converse statement [1] (c) (i) 0.5 – 2.5 or 2 [1] (ii) A [1] because the volume of gas was still increasing at 100s/ 48cm³ of gas had not been produced at 100s [1] [2] (iii) Record the volume between 40s and 60s in 2s intervals [1] (iv) 3 [1]		8
7	(a) The stirrer disperses the heat through the mixture/mixes the chemicals evenly [1] (b) (i) A because the pH starts at 14 which is alkali (and then drops) No marks awarded if an explanation is not provided [1] (ii) In graph A, the temperature change increases as the pH decreases/ in graph B, the temperature change only increases as pH increases up to pH 7 (and then decreases) [1] (iii) As the volume of the liquid increases, the temperature increases [1] At a volume of 25cm³/at a pH of 7 the temperature starts to decrease [1] [2]		5

Section B

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Section C – Physics

Section C – Physics			AVAILABLE MARKS	
8	(a)	Length/m label must include units	[1]	10
	(b)	0.2 m	[1]	
	(c) (i)	4.2 circled in table	[1]	
	(ii)	She did not use it to calculate the average	[1]	
	(iii)	(6.9 + 6.8 + 6.8) or 20.5/3 [1] 6.8333 [1] 6.8 [1]	[3]	
	(d)	To improve reliability/to identify anomalous results Do not accept to get an average	[1]	
	(e) (i)	As the (cross-sectional) area of the wire increases, the resistance decreases	[1]	
	(ii)	4.2Ω (±0.1)	[1]	
9	(a)	40 to 50 minutes	[1]	4
	(b) (i)	A	[1]	
	(ii)	136–24 or 112	[1]	
	(iii)	More/greater/longer	[1]	
10	(a) (i)	Voltage	[1]	
	(ii)	Temperature	[1]	
	(b)	Indicative content		
		• Ammeter • Connected in series • Voltmeter • Connected in parallel • Change the voltage on the power pack • Record the current and voltage • Repeat for several different voltages • Plot a graph of V/I • Straight line through the origin		

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe an experiment to prove Ohm's law using seven to nine of the points on page 6, 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 to describe an experiment to prove Ohm's law using four to six of the points on page 6, 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 an experiment to prove Ohm's law using one to three of the points on page 6. 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	Not worthy of credit	[0]

[6]

(c) $\text{resistance} = \frac{\text{voltage}}{\text{current}}$

[1]

Section C

Total

**AVAILABLE
MARKS**

9

23

70