



**General Certificate of Secondary Education
2022**

Single Award Science

Unit 4

Booklet B

Higher Tier

[GSA44]

THURSDAY 9 JUNE, 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 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.

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.

Section A – Biology

			AVAILABLE MARKS
1	(a)	To make the cells look bigger	[1]
	(b)	To reflect light on to the cells	[1]
	(c)	(B) A C D E Any two in the correct order [1]	[2]
	(d) (i)	Make sure hands are washed before and after/make sure cotton bud is disposed of (in disinfectant after use)	[1]
	(ii)	Nucleus	[1]
	(iii)	B – as there is no cell wall present	[1]
	(e)	To allow us to see the organelles more clearly	[1]
			8
2	(a)	The volume of water is not the same [1] the distance of the crisp from the boiling tube is not the same [1]	[2]
	(b) (i)	20 °C	[1]
	(ii)	The starting masses were all different	[1]
	(iii)	No fat in crisp C but still gives a high temperature rise per gram	[1]
	(iv)	So no energy remains locked in the unburnt crisp	[1]
			6
3	(a) (i)	violet: 80 s blue: 40 s	[1]
	(ii)	2	[1]
	(iii)	No – green takes the longest time to release 10 cm ³ of gas	[1]
	(iv)	To control the colour of light	[1]
	(b)	To allow the pondweed to acclimatise to the colour of light	[1]
	(c)	Oxygen	[1]
	(d)	More accurate/student could have missed some of the bubbles when counting	[1]
	(e) (i)	Iodine	[1]
	(ii)	Blue/black	[1]
Section A Total			9
			23

Section B – Chemistry

			AVAILABLE MARKS
4	(a) (i)	Temperature of mixture	[1]
	(ii)	Volume of acid	[1]
	(iii)	To allow the reactants (acid and alkali) to mix	[1]
	(iv)	The cup is made of polystyrene/lid	[1]
	(v)	This will take the temperature of the air not the mixture	[1]
	(b) (i)	10.4 °C	[1]
	(ii)	A	[1]
	(c) (i)	Temperature rise/°C	[1]
	(ii)	110 s	[1]
	(iii)	Measure the temperature every 5 seconds	[1]
			10

5 (a) Indicative points

- Safety goggles/take care with acid
- Measure out a known volume of acid using the **measuring cylinder**
- Add the reactants together
- Start stopwatch
- Record time it takes for the reaction to complete
- Repeat for each acid (1M and 2M)
- Expected result: fastest time should be the most concentrated/2M acid
- Fair test: same volume acid/same temperature/same mass of marble chips

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the experiment, in a logical sequence using six to eight of the above points and must also include a result. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates must use some appropriate specialist terms throughout to describe the procedure, using three to five of the above points. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe the procedure using only one or two of the above points 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]

- (b) (i) Mass would decrease [1] because a gas is escaping [1]
the mass would stay constant when the reaction finished [1] [3]

- (ii) To stop the acid splashing out of the conical flask [1] 10

- 6 (a) 24 cm³ [1]

- (b) D [1]
distinct colour at pH7 [1] [2]

- (c) A pH meter/probe gives a reading to 1dp/gives the pH number rather than a colour [1] 4

Section B Total

24

Section C – Physics

			AVAILABLE MARKS
7	(a) (i)	The hottest spoon	[1]
	(ii)	The two insulators would feel the same temperature	[1]
	(b) (i)	All the beakers all have the same finishing temperature	[1]
	(ii)	Z, X, Y, W (reverse order [1])	[2]
	(iii)	To see if it was the insulation which affected temperature drop	[1]
	(c) (i)	The thicker the insulation the slower the drop in temperature [1] as time increases temperature decreases [1]	[2]
	(ii)	92–22 [1] 70 °C [2]	[2]
8	(a)	Temperature	[1]
	(b) (i)	5 points plotted correctly [2] 4 points plotted correctly [1] line of best fit [1]	[3]
	(ii)	Straight line [1] through (0,0) [1]	[2]
	(c)	Resistance = voltage ÷ current	[1]
	(d)	0.70 A–0.80 A	[1]
	(e)	The resistance is affected by the cross-sectional area of the wire	[1]
			9
9	(a) (i)	534	[1]
	(ii)	The result was ignored	[1]
	(iii)	Sample is too small	[1]
	(b)	The reaction time was not taken before the cola to compare the results	[1]
Section C Total			23
Total			70