



**General Certificate of Secondary Education
2021–2022**

Single Award Science: Physics

Unit 3

Higher Tier

[GSA32]

FRIDAY 25 FEBRUARY, 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.

			AVAILABLE MARKS
1	(a) Neutral	[1]	5
	(b) Brown	[1]	
	(c) Too much current [1] wire melts and breaks [1]	[2]	
	(d) Cable grip/plastic cover/earth wire	[1]	
2	(a) More sheets of paper means less voltage produced	[1]	4
	(b) (i) Anomalous	[1]	
	(b) (ii) Repeat and average/discard the result	[1]	
	(c) Any one from: <ul style="list-style-type: none"> • same light/power sources • same distance between light and solar cells 	[1]	

3 (a) Indicative content

- Sun is our star
- Sun/star at centre/planets orbit the Sun
- 8 planets in our solar system
- name of 2 planets
- comparison of planet's location
- moon/asteroids/comets
- moons orbit planets
- gravity keeps planets in orbit

	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe fully the structure of the Solar System (using at least 6 of the above points). 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 partially describe the structure of the Solar System (using 4 or 5 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 structure of the Solar System (using 1 to 3 of the above points). However, these are not in a logical sequence. 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]

- (b)** 25 – 10/15 × 80 [1]
1200 [1]

[2]

8

- 4 (a) (i)** As time increases, temperature of flask decreases

[1]

- (ii)** Flask B cools slower

[1]

- (iii)** A as dark matt is the best emitter

[1]

- (b) (i)** Convection

[1]

- (ii)** Copper is a good conductor of heat

[1]

5

AVAILABLE
MARKS

			AVAILABLE MARKS		
5	(a)	(i) 2 m	[1]	11	
		(ii) Horizontal line across grid from top of B	[1]		
		(iii) $\frac{10}{3} = 3.33$ [1] 3.3 [2]	[2]		
	(iv) Toy C is slower/toy A is faster	[1]			
	(b)	(i) Each year the number of drivers caught speeding increases	[1]		
		(ii) Speed bumps	[1]		
	(c)	(i) Rougher surface creates more friction [1] more friction means a lower braking distance [1]	[2]		
		(ii) No effect	[1]		
		(iii) Speed	[1]		
	6	(a)	(i) Wool		[1]
(ii) $\frac{48}{60}$ [1] 80% [2]			[2]		
(b)			(i) 5 cm	[1]	
(ii) 3 cm		[1]			
(c)		Vibrate [1] parallel to the wave direction [1]	[2]		
(d)		Energy/microwaves absorbed by water molecules [1] molecules vibrate faster [1] friction between molecules produces heat [1]	[3]		
7		(a)	A = step up B = step down	[1]	
		(b)	Voltage is increased [1] current is reduced [1] less energy/heat lost in transmission [1]	[3]	4

8 (a) $60\,000 \div (400 \times 10)$ [1]
15 [1] [2]

(b) (i)

Position on track	Type of energy	
	Gravitational potential	Kinetic
W	✓	
X	✓	✓
Y		✓

[1]

(ii) Heat/sound [1]

(c) Resultant force [1]
unbalanced forces/weight greater than friction [1] [2]

9 (a) Time taken (2 hours) [1]
for half the atoms to decay/activity to fall by a half [1] [2]

(b) The activity reaches zero/nearly zero [1]

(c) C [1]
alpha will stay in tumour/will not penetrate healthy cells [1]
half-life is 10 months (qualified) [1] [3]

(d) Electrons added/lost to/from an atom [1]

Total

AVAILABLE MARKS
6
60