GCSE MARKING SCHEME

SUMMER 2024

GCSE
SCIENCE (DOUBLE AWARD) – UNIT 6
PHYSICS
FOUNDATION TIER
3430U60-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

GCSE SCIENCE (DOUBLE AWARD) UNIT 6 – PHYSICS 2

FOUNDATION TIER

SUMMER 2024 MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statement.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of dou

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		has a constant speed	1			1		
		(ii)		is not moving	1			1		
		(iii)		has a constant speed	1			1		
	(b)	(i)		300 [km]		1		1	1	
		(ii)		Time = 5 [hours] (1) Speed = $\frac{300\ \textbf{ecf}}{5}$ (1) = 60 [km/h] (1) Accept an answer of 75 [km/h] for 2 marks	1	1 1		3	3	
	(c)			100 (1) 200 **and** Robert (1)			2	2	2	
				Question 1 total	**4**	**3**	**2**	**9**	**6**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			Mass	1			1		
	(b)	(i)		2 [units]		1		1		
		(ii)		100 [units]		1		1		
				Question 2 total	**1**	**2**	**0**	**3**	**0**	**0**

<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td></td><td>
<table>
<tr><th>Property of the ball</th><th>Stays constant</th><th>Gets smaller</th><th>Gets larger</th></tr>
<tr><td>acceleration</td><td>✓</td><td></td><td></td></tr>
<tr><td>speed</td><td></td><td>✓</td><td></td></tr>
<tr><td>kinetic energy</td><td></td><td>✓</td><td></td></tr>
<tr><td>potential energy</td><td></td><td></td><td>✓</td></tr>
<tr><td>total energy</td><td>✓</td><td></td><td></td></tr>
</table>
1 mark for each correct row</td><td>4</td><td></td><td></td><td>4</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>Substitution: 0.46 × 10 (1)
= 4.6 [N] (1)</td><td>1</td><td>1</td><td></td><td>2</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Substitution: 4.6 (ecf) × 15 (1)
= 69 (1)
Joules or J or N m (1)</td><td>1

1</td><td>1</td><td></td><td>3</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td>[Yes because]
acceleration [due to gravity] is the same as gravitational field strength
or no other forces acting
or $a = g$
or weight = 0.46 × 10 also
or weight is 4.6 [N]
or gravitational field strength = 10 or g is 10
Accept they’re both 10 or we only multiplied by 10</td><td></td><td></td><td>1</td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 3 total</td><td>7</td><td>2</td><td>1</td><td>10</td><td>4</td><td>0</td></tr>
</table>

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			**Indicative content:** 1. Set up a pointer in the clamp stand and adjust its height. 2. The height (distance 2) should be at least 100 cm above the floor. Measure and record this height using a metre ruler. 3. Drop a single cake case from a height (distance 1) at least 15 cm above the pointer. 4. Using a stopwatch, measure and record the time it takes to fall from the pointer to the floor. 5. Repeat steps 3 and 4. 6. Repeat by adding more cake cases to the stack. **5–6 marks** Detailed description of apparatus set-up and suitable values **and** the measurements taken. *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3–4 marks** Detailed description of either apparatus set-up and suitable values or the measurements taken **OR** limited description of both. *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.*	6			6		6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1–2 marks Limited description of either apparatus set-up and suitable values **or** the measurements taken. *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks** *No attempt made or no response worthy of credit.*						
	(b)	(i)		1.5		1		1	1	1
		(ii)	I	4 points correct < 1 small square (2) not including (0,0) and (1.5, 4.8) 3 points correct < 1 small square (1) 2 points or less correct (0)		2		2	2	2
			II	(1.5,4.8) not judge the accuracy of the point		1		1		1
			III	Reasonable best fit curve starts at the origin		1		1	1	1
		(iii)		Read from candidate's graph for a mass of 0.5 [g] Allow ± 0.1 m/s tolerance		1		1	1	1
				Question 4 total	**6**	**6**	**0**	**12**	**5**	**12**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		Francium[-223]		1		1		
		(ii)		60 [hours] in Sodium-24 column (1) [Technetium-99m column] 6 [hours] (1) 12-18-24-30 [hours] (1)		3		3	2	
	(b)	(i)		Gamma passes through steel **or** is very penetrating (1) The reading will rise when passing through a crack (1) Accept isotope decays slowly **or** iridium has a long half-life **or** it is active for a long time		2		2		
		(ii)		Beta {is ionising / kills [tumour] cells / absorbed by tumour / can penetrate the [whole] tumour} (1) Isotope remains active for long enough (1)		2		2		
		(iii)	I	Emits alpha radiation (1) which ionises [cells] the most **or** half-life is quite long **or** takes 3 weeks to decay to safe level (1)	1	1		2		
			II	Depends on [type of] rock Accept it increases with an earthquake	1			1		
				Question 5 total	**2**	**9**	**0**	**11**	**2**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			Ticks in boxes 1 and 2 i.e. Our solar system originated from a cloud of gas and dust The heavy elements in our solar system originated from a supernova -1 mark for each additional tick	2			2		
	(b)	(i)		Venus			1	1	1	
		(ii)		Venus			1	1	1	
		(iii)		Saturn is the largest [gas giant] (1) but its day is shorter than {Uranus / Neptune} (1) so agree with Rhian Judgement must be present to award 2 marks			2	2		
				Question 6 total	**2**	**0**	**4**	**6**	**2**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			Measure count rate in absence of any radioactive isotope (1) accept measure the count rate on its own Deduct from count rates [when radioactive isotopes are present] (1)	2			2		2
	(b)	(i)		Gamma (1) only Cobalt[-60] (1)			2	2		2
		(ii)		Beta (1) and gamma (1) Silver[-110] (1)			3	3		3
	(c)	(i)		47		1		1		
		(ii)		63		1		1		
				Question 7 total	**2**	**2**	**5**	**9**	**0**	**7**

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SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL	MATHS	PRAC
1	4	3	2	9	6	0
2	1	2	0	3	0	0
3	7	2	1	10	4	0
4	6	6	0	12	5	12
5	2	9	0	11	2	0
6	2	0	4	6	2	0
7	2	2	5	9	0	7
TOTAL	**24**	**24**	**12**	**60**	**19**	**19**