GCSE MARKING SCHEME

SUMMER 2022

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

INTRODUCTION

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCSE SCIENCE (DOUBLE AWARD) – UNIT 6 – PHYSICS 2

FOUNDATION TIER

SUMMER 2022 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.

<u>Marking abbreviations</u>

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 doubt
owtte =   or words to that effect

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1.	(a)	(i) (ii) (iii)		Number of cake cases (1) Time of fall (1) Speed up (1)	1 1 1			3		3
	(b)	(i)		0.75 [s] circled	1			1		1
		(ii)		Sum = 0.55 + 0.56 + 0.55 + 0.58 = 2.24 (1) Mean = $\dfrac{2.24}{4}$ = 0.56 [s] (1) Accept 0.6 s where this calculation is shown **Award only 1 mark** for the mean if 0.75 is included (mean = 0.60 [s]) **Award only 1 mark** if no workings are shown and answer of 0.6 [s] or 0.598 [s] Don't accept 0.59 [s] **Alternative:** $\dfrac{1.50}{2.7}$ (1) = 0.56 [s] (1) accept 0.555 [s] or 0.6 [s] Award 1 mark for $\dfrac{150}{2.7}$ = 55.5 or 56	1	1		2	2	2

Question			Marking details	AO1	AO2	AO3	Total	Maths	Prac
(c)	(i)		All points plotted correctly < 1 small square tolerance award 2 marks (ignore (0,0)) 4 points plotted correctly < 1 small square tolerance award 1 mark 3 or fewer points plotted correctly < 1 small square tolerance award 0 marks Smooth curve passing through the points between 1-5 on the number of cake cases < 1 small square tolerance (1)		3		3	3	3
	(ii)		Increases (1) Decreasing (1)		2		2		2
			Question 1 total	**4**	**7**	**0**	**11**	**5**	**11**

Question				Marking details				Marks Available					
								AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
2.	(a)							3			3		

Factor	Thinking distance	Braking distance	Stopping distance
Worn tyres	✗	✓	✓
Drunk driver	✓	✗	✓
Wet road	✗	✓	✓

Award 1 mark for each correct column

Question				Marking details	Marks Available					
	(b)			Time = $\dfrac{9.1}{13}$ (1) = 0.7 [s] (1)	**AO1** 1	**AO2** 1	**AO3**	**Total** 2	**Maths** 2	**Prac**
	(c)			23 [m] (1) is less than 30 [m] **or** so it stops [before the crossing] (1) **Award 2 marks** for it stops with 7 [m] to spare No marks can be awarded if no reference to 23 m or 7 m		2	2	2	1	
				Question 2 total	**4**	**1**	**2**	**7**	**3**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3.	(a)			Order is: B, C, A, D. 3 marks for all 4 correct 2 marks for 2 or 3 correct 1 mark for 1 correct	3			3		3
	(b)			**Any 2 × (1) from:** - Move the ruler nearer [the spring] - Clamp the ruler in place / ensure the ruler is vertical - Use a ruler marked in mm **or** with better resolution. Accept measure in mm. - Use a pointer [from the (bottom of the) spring to the ruler] Don't accept use a laser pointer. Don't accept repeat the experiment **or** use a metre ruler **or** use a camera **or** more accurate ruler.			2	2		2
	(c)	(i)		4 [N]	1			1	1	1
		(ii)		$k = \dfrac{4 \ \mathbf{ecf}}{8}$ (1) = 0.5 [N/cm] (1)	1	1		2	2	2
		(iii)		400 g to 200 g (1) So 8 cm goes to 4 cm (1) [so the claim is false]. **Alternative:** Mass is half of 400 g (1) So the extension is 4 cm (1) [so the claim is false]. **Alternative:** 2 cm is a quarter of the 8 cm extension (1) so the force is 1 N / mass of 100 g (1) [so the claim is false].			2	2	1	2
				Question 3 total	**5**	**1**	**4**	**10**	**4**	**10**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4.				**Indicative content:** In the first 5 seconds (A to B) the car accelerates uniformly from rest (0 m/s) to a velocity of 6 m/s. From B to C takes 15 s (i.e. 5 to 20) travelling at a constant velocity of 6 m/s. From C to D the car has a constant deceleration from 6 m/s to rest over 10 s. **5–6 marks** Comprehensively describes all three parts of the motion in detail and includes all values relevant to the motion. *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** Comprehensively describes two of the parts of the motion in detail with some values **or** limited description of all three parts with some values included. *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.* **1–2 marks** Gives a limited description of one or two parts of the motion **or** description given of all parts with no data included. *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.*	3	3		6	3	
				Question 4 total	**3**	**3**	**0**	**6**	**3**	**0**

Question				Marking details	AO1	AO2	AO3	Total	Maths	Prac
5.	(a)	(i)		In order: D, C, A, B 3 marks for all 4 correct 2 marks for 2 or 3 correct 1 mark for 1 correct		3		3	3	
		(ii)		Radon gas section would be smaller (1) but every other section would be larger (1) N.B. to award any marks **section** (owtte) must be stated at least once			2	2		
	(b)	(i)		Count rate / activity / number of undecayed particles / number of nuclei / number of atoms	1			1		
		(ii)		50 (1) 25 (1)		2		2	2	
		(iii)		Nucleons – 210 (1) Protons - 84 (1) Neutrons - 126 (1)	1 1	1		3	1	
				Question 5 total	**3**	**6**	**2**	**11**	**6**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		Substitution: work done = 450 × 0.8 (1) × 2 (1) = 720 (1) [J] Answer 360 [J] award 2 marks **Alternative:** 2 × 0.8 = 1.6 [m] (1) 450 × 1.6 (1) = 720 (1) [J]	1 1	1		3	3	
		(ii)		Answer from (i) **ecf** expect 720 [J] **or** 720 [J]	1			1		
		(iii)		[Work done in overcoming] friction / lifting the forks **or** [energy transferred as] sound / heat		1		1		
	(b)			450 − (12 × 10) = 330 [N] (1) $\dfrac{330}{10}$ = 33 (1) [kg] **Alternative:** $\dfrac{450}{10}$ = 45 (1) [kg] 45 − 12 = 33 (1) [kg]		2		2	2	
				Question 6 total	**3**	**4**	**0**	**7**	**5**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7.	(a)	(i)		Callisto		1		1		
		(ii)		Moons of Jupiter get their heat from the Sun / Jupiter doesn't give out [much] heat / Jupiter isn't a star / Jupiter is a planet (1) They are [about] the same distance from the Sun / don't orbit the Sun (1)			2	2		
		(iii)		Callisto doesn't have the largest mean <u>diameter</u> [so claim not true] **Alternative:** Callisto has a smaller mean <u>diameter</u> than Ganymede [so claim not true]. Accept the converse. Accept correct reference to data.			1	1		
		(iv)		671 000 × 2 = 1 342 000 [km] [so not true] **Alternative:** $\dfrac{1070\,400}{2} = 535\,200$ [km] [so not true] **Alternative:** $\dfrac{1070\,400}{671000} = 1.6$ [so not true] **Alternative:** 1 070 400 − 671 000 = 399 400 [so not true]			1	1	1	

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
(b)	(i)		Box 3. A light minute is the distance travelled by light in 60 seconds. Extra tick award 0 marks	1			1		
	(ii)		Mean distance = $\dfrac{588\,000\,000}{3.92}$ (1) = 150 000 000 (1) [km] accept 1.5×10^8 [km] or 150×10^6 [km]	1	1		2	2	
			Question 7 total	**2**	**2**	**4**	**8**	**3**	**0**

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	Marks Available					
	AO1	AO2	AO3	Total	Maths	Prac
1	4	7	0	**11**	5	11
2	4	1	2	**7**	3	0
3	5	1	4	**10**	4	10
4	3	3	0	**6**	3	0
5	3	6	2	**11**	6	0
6	3	4	0	**7**	5	0
7	2	2	4	**8**	3	0
Total	**24**	**24**	**12**	**60**	**29**	**21**

3430U60-1 WJEC GCSE Double Award Science – Unit 6 Physics FT MS S22/CB