Rewarding Learning

General Certificate of Secondary Education
2013–2014

Double Award Science: Physics

Unit P1

Higher Tier

[GSD32]

MONDAY 19 MAY 2014, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

AVAILABLE MARKS

1 **(a)** **(i)** Correct scale for y axis [1]
Correct label for y axis [1] [2]

(ii) 4 points correctly plotted [2] 3 points [1]
line of best fit [1] [3]

(b) grad $= \frac{\text{rise}}{\text{run}}$ or $\frac{R}{v}$ [1] or equivalent

$= \frac{120}{20}$ [1] or equivalent

$= 6$ [1]

s [1] [4]

(c) $R = 72(m) \pm 4$ [1] 10

2 **(a)** Two light small hydrogen [1] nuclei [1]
Combine/join/fuse (together) [1]
To form (a more stable helium) nucleus [1] or heavier nucleus
new nucleus
Producing energy [1]
In the stars/in the sun [1] [6]

Response	Mark
Candidates explain **5** or **6** of the above points. They use good spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5–6]
Candidates explain **3** or **4** of the above points. They use satisfactory spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made use of some specialist terms.	[3–4]
Candidates explain **1** or **2** of the above points. They use limited spelling, punctuation and grammar. The form and style are of a limited standard and they have made no use of specialist terms.	[1–2]
Response not worthy of credit.	[0]

(b) **(i)** solve world's energy needs/saves fossil fuels/less air pollution [1]

(ii) difficulty of containment/stability [1] or reference to container or particle density or time or pressure
(sufficiently) high temperature [1] [2] 9

	AVAILABLE MARKS

3 **(i)** W.D. = Force × distance [1]
= 150 [1] × 8.4 [1]
= 1260 (J) [1] [4]

(ii) G.P.E or P.E. or potential [1]

(iii) Eff. = O/p energy / i/p energy [1] or equivalent f'la
= 1260/2100 [1] Allow e.c.f. from part **(i)**
= 0.6 [1] [3] — 8

4 **(i)** Vol = l × b × h or 0.6 × 0.3 × 0.2 [1]
= 0.036 or 0.04 [1] [2]

(ii) m = density × v [1] or equivalent
= 2700 × 0.036 [1]
= 97.2 (kg) [1] [3] — 5

5 Applied force and
Acceleration noted (e.g light gates) [1]
Repeat [1]
Calculate ratio F/a **or** Plot a against F [1]
Straight line through origin [1]
Conclusion: a ∝ F [1] [6] — 6

Response	**Mark**
Candidates explain **5 of** the above points. They use good spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5–6]
Candidates explain **3 or 4** of the above points. They use satisfactory spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made use of some specialist terms.	[3–4]
Candidates explain **1 or 2** of the above points. They use limited spelling, punctuation and grammar. The form and style are of a limited standard and they have made no use of specialist terms.	[1–2]
Response not worthy of credit.	[0]

6 **(a)** **(i)** B to C [1]

(ii) B to C [1]

(iii) C to D [1]

(iv) Drag/Friction or Air resistance [1] [4]

(b) Height = area under graph [1]
= (50 × 5) + (50 × 15)/2 [1] each
= 625 (m) [1] [4] — 8

				AVAILABLE MARKS
7	**(a)**	$^{238}_{93}Np + ^{0}_{-1}\beta$ [4]		
	(b)	**(i)** time taken or how long [1] for the count rate to decrease by half [1]	[2]	
		(ii) 50 → 25 → 12.5 → 6.25		
		or [1]		
		[1]		
		3 half lives [1]		
		(3 × 46 =) 138 days [1]	[4]	10
8	**(a)**	CM = ACM [1] for a body in equilibrium [1]	[2]	
	(b)	**(i)** W × 10 = 5 × 32 [1] each side W = 16 (N)	[3]	
		(ii) 21 (N) e.c.f. from **(b)(i)** e.c.f. i.e. "their weight" + 5(N)	[1]	6
9	**(a)**	pe = mgh [1] 440 × 10 × h = 52 800 [1] h = 12 (m) [1]	[3]	
	(b)	**(i)** KE = 56 320	[1]	
		(ii) e.c.f. from **(b)(i)**		
		$KE = \frac{1}{2} mv^2$ [1]		
		$56\,320 = \frac{1}{2} \times 440 \times v^2$ [2]		
		v = 16 (m/s) [1]	[4]	8
			Total	**70**