Rewarding Learning

General Certificate of Secondary Education
2012–2013

Double Award Science: Physics

Unit P1

Higher Tier

[GSD32]

WEDNESDAY 27 FEBRUARY 2013
9.30 am–10.30 am

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)**	A = Neutron [1] B = Protons [1] C = Nucleus [1] D = Electrons [1]		
		(ii)	Total of positive charge = total of negative charge or number of protons = number of electrons [1]		
		(iii)	Alpha has no electrons Alpha is (doubly) positively charged Alpha has two neutrons Alpha has a bigger mass Any two [1] each [2]		
	(b)	**(i)**	Heavy nucleus splits [1] into two light nuclei energy released fission neutrons produced [3]	any 2 from 3 points	
		(ii)	Uranium [1] Plutonium [1]		12
2	**Apparatus:**		Metre stick, pivot, (hanging) masses (any 2) [1]		
	Use:		Balance ruler on pivot Place masses on either side Balance again Measure distances to pivot from masses Table of results [4]	any 4 points for 4 marks	
	Formula:		CM = ACM [1]		

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]

6

						AVAILABLE MARKS
3	**(i)**					

m in kg	0	0.1	0.2	0.3	0.4	0.5
T in s	0	0.63	0.90	1.10	1.26	1.41
T^2 in s^2	**(0)**	***0.4***	***0.8***	***(1.2)***	***1.6***	***2.0***

All values of T^2 correct
3 values only correct [1] [2]

(ii) Scale more than half [1]
5 or 6 points correct [2]
3 or 4 points [1] [3]

(iii) Best fit line through candidate's points [1]

(iv) **(**Yes), Graph is a straight line [1] through origin [1] [2]

(v) K = 1.6/0.4 (or other) [1]
= 4 (s^2/kg) [1] 10

4 **(i)** Meet (world) energy demands
fossil fuels are running out/conserve fossil fuel [2]

(ii) $^{3}_{1}H + {}^{2}_{1}H \rightarrow {}^{4}_{2}He + {}^{1}_{0}n$ (each bold number 1 mark) [6] 8

5 **(a)** **(i)** alpha, beta, gamma or α, β, γ [3]

(ii) (e.m.) wave [1]

(iii) It is unstable [1]

(b) **(i)** gamma or γ [1]

(ii) the only one which will penetrate to detector [1]

(iii) detector reading (high) or detector reading changes or count change [1] 8

				AVAILABLE MARKS
6	**(i)**	Smooth curve through all points MUST include (0,94) on curve	[1]	
	(ii)	Selection of suitable points e.g. 94 and 47 [1] Drawing parallel and vertical lines [1] or 1 vertical/horizontal line if y-axis is used. Half-life = 26 + or – 1 (s) [1]	[3]	4
		If straight line drawn instead of curve [0]/[3] BUT allow ecf for a CURVE.		
7	**(i)**	Drag/Friction	[1]	
	(ii)	$a = \Delta v/t$ or equivalent [1] or $a = \frac{v - u}{t}$ $0.25 = 3/t$ [1] $t = 12$ (s) [1]	[3]	
	(iii)	$F = ma$ [1] $= 120 \times 0.25$ [1] = 30 (N) [1]	[3]	7
8	**(i)**	Ball is going in opposite direction [1]	[1]	
	(ii)	height = area under graph [1] $= (15 \times 1.5)/2$ [1] = 11.25 (m) [1]	[3]	
	(iii)	a = gradient or $a = \Delta v/t$ [1] $a = 30/3$ [1] $a = 10$ [1] Allow [1]/[3] ONLY for answer if no work shown	[3]	7
9	**(a)**	$W = F \times d$ [1] $= 8000 \times 1.5$ [2] = 12 000 (J) [1]	[4]	
	(b)	12 000 (ecf from (a)) [1]	[1]	
	(c)	$ke = \frac{1}{2} m v^2$ [1] $4900 = \frac{1}{2} 800 v^2$ [1] $v = 3.5$ (m/s) [1]	[3]	8
			Total	**70**