New Specification

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Double Award Science: Physics

Unit P1

Higher Tier

[GSD32]

WEDNESDAY 29 FEBRUARY 2012
9.30 am–10.30 am

MARK SCHEME

		AVAILABLE MARKS
1	**(a)** **(i)** At rest [1] [1]	
	(ii) Bigger or steeper gradient [1] [1]	
	(b) Distance $= 8$ (m) [1]	
	(c) Average Speed $=$ Gradient [1] $= \frac{18}{12}$ [1] $= 1.5$ (m/s) [1] [3]	6
2	**(i)** KE $= \frac{1}{2}mv^2$ [1] [1]	
	(ii) $= \frac{1}{2} \times 7500 \times 20^2$ [1] $= 1500000$ (J) [1] [2]	
	(iii) Work $= 1500000$ (J) [1] e.c.f. from (ii) [1]	
	(iv) Power $=$ Work done/time [1] $= 1500000/20$ [1] $= 75000$ (W) [1] [3] Allow e.c.f. from (ii) or (iii).	
	(v) 75 (kW) allow e.c.f. from (iv) [1] [1]	8
3	● Two light nuclei [1] ● Join together or combine or fuse [1] ● To form a different nucleus [1] ● Energy is released [1] ● Decrease in mass [1] ● High temperature [1]	

Response	**Mark**
Candidates must use appropriate specialist scientific terms throughout to describe fully and in a logical sequence the process of fission in a nuclear reactor using **all** the points shown in the indicative content above. They use good spelling, punctuation and grammar throughout and the form and style are of a high standard.	**[5-6]**
Candidates use some appropriate specialist scientific terms to partially describe, in a logical sequence, **3 or 4** points relating to nuclear fission shown in the indicative content above. They use satisfactory spelling, punctuation and grammar and the form and style are of satisfactory standard.	**[3-4]**
Candidates use limited specialist scientific terms to describe **1 or 2** of the points relating to fission shown in the indicative content above. Their spelling, punctuation, grammar, form and style are of a limited standard.	**[1-2]**
Response not worthy of credit.	**[0]**

6

			AVAILABLE MARKS
4	**(a)** 1.2, 2.6 2 correct = [2], 1 correct = [1]	[2]	
	(b) Scale > half of axis [1] } if non linear scale Deduct [1] for each incorrect point } then 0/4 within ± 1 square	[4]	
	(c) **(i)** Straight line [1], including origin [1] dependent marking ± 1 square	[2]	
	(ii) Yes [1] Straight line through origin [1] allow e.c.f. from (c)(i)	[2]	10
5	**(a)** **(i)** Increases [1]	[1]	
	(ii) Decreases [1]	[1]	
	(b) Direction (of vel.) changes/velocity is a vector [1]	[1]	
	(c) $v = \frac{mom}{mass}$ or mom = mass × velocity or p = mv [1] = 2.4/0.2 [1] = 12 (m/s) [1]	[3]	6
6	**(i)** ACM = CM [1] or $F_1d_1 = F_2d_2$ W × 3[1] = 2400 × 6.6 [1] W = 5280 (N) [1]	[4]	4
7	**(i)** a = (v − u)/t [1] = 0.6/3 [1] = 0.2 (m/s^2) [1]	[3]	
	(ii) F = ma [1] F = 200 × 0.2 [1] allow e.c.f. from (i) F = 40 (N) [1]	[3]	6
8	**(i)** Nuclei (unstable) [1] Emit radiations (spontaneously) or disintegrates/decays [1]	[2]	
	(ii) same number of protons [1] but different numbers of neutrons [1]	[2]	
	(iii) 0 [1] 8 [1] 6 [1]	[3]	
	(iv) Fast moving electrons [1]	[1]	
	(v) (High freq.) e.m. (radiation) [1]	[1]	9

				AVAILABLE MARKS
9	**(a)**	Electrons dotted like currants [1], positive charge was to be spread throughout [1]	[2]	
	(b)	**(i)** Electrons in orbit [1] or in shells		
		(ii) Nuclei were tiny [1] or small		
		(iii) Most mass is in the nucleus [1]	[3]	5
10	**(a)**	It is the time taken [1] for the activity to decrease by half [1] (dependent marking) only gets access to activity mark if first mark given	[2]	
	(b)	**(i)** 3 (half-lives) [1] $\frac{1}{8}$ (th) [1]	[2]	
		(ii) Random (decay) [1]	[1]	
	(c)	232 for Thorium [1] 88 for Ra [1] $^{4}_{2}$He or $^{4}_{2}\propto$ [3] } all free-standing marks	[5]	10
			Total	**70**