



Rewarding Learning

**General Certificate of Secondary Education
2011–2012**

Double Award Science: Physics

Unit P1

Higher Tier

[GSD32]

THURSDAY 24 MAY 2012, MORNING

**MARK
SCHEME**

- 1 (a) [Atoms with] same Z no. [1] but different A nos [1] [2]
 (b) *Nucleus* contain protons + neutrons [1]
 Orbiting electrons [1]
- 2 (a) (i) A [1]
 (ii) Z [1]
 (iii) 238 [1]
 92 [1]
 146 [1]
 (iv) 1. Alpha or α [1]
 2. Different atomic number or different place on periodic table [1]
- (b) N.I.M.B.Y.
 Long term necessity of N fuel/conserves fossil fuel
 Treatment of cancers
 Waste argument
 No polluting gases
 Safety/causes cancer
 Proliferation of N. weapons [5–6]

AVAILABLE
MARKS

4

Response	Mark
Candidates must use appropriate specialist scientific terms throughout to describe fully and in a logical sequence the problems of nuclear power stating 5–6 of 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 throughout to partially describe and in a logical sequence the problems of nuclear power stating 3 or 4 of the points shown in the indicative content above. They use satisfactory spelling, punctuation and grammar throughout and the form and style are of satisfactory standard.	[3–4]
Candidates must use limited specialist scientific terms to describe fully and in a logical sequence the problems of nuclear power stating 1 or 2 of the points shown in the indicative content above. Their spelling, punctuation and grammar throughout and the form and style are of a limited standard.	[1–2]
Response not worthy of credit.	0

13

			AVAILABLE MARKS		
3	(a)	9 16	[1] [1]	10	
	(b)	Scale $> \frac{1}{2}$ of h axis	[1]		
		4 or 5 points correct [2] 2 or 3 points correct [1] } tolerance ± 1 square	[2]		
	(c)	Line of best fit [1]	[1]		
(d)	Grad = $\frac{Y_2 - Y_1}{x_2 - x_1}$	[1]	4		
	Appropriate values	[1]			
	= 5 ± 0.2	[1]			
	m/s ²	[1]			
4	(i)	Volume = $0.6 \times 0.5 \times 0.2$	[1]	5	
		= $0.06 \text{ (m}^3\text{)}$	[1]		
(ii)	Mass = Density \times Volume	[1]	6		
	= 8400×0.06 e.c.f. from (a)(i)	[1]			
	= 504 (kg)	[1]			
5	(a)	A B C	[3]	6	
		(b)	Distance = Area		[1]
			= $(3 \times 8)/2$ = 12 (m)		[1] [1]
6	(i)	Fission	[1]	5	
		Neutron	[1]		
	(iii)	Uranium or plutonium	[1]		
	(iv)	Any 2 from: smaller nuclei formed or nucleus splits <i>neutrons</i> produced	[2]		
7	(a)	Every 3.6 days, [1] OR the <i>time</i> taken	[1]	7	
		The activity halves or count rate halves [1]	[2]		
	(b)	(i) $\frac{1}{2}$ mark each, round down	[2]		
		(ii) Curve through (0,800) and points plotted [e.c.f. from (i)]	[1]		
		(iii) 282 [300 – 260] allow e.c.f. from (ii)	[1]		
(iv)	1600	[1]			

			AVAILABLE MARKS
8 (a) (i)	Friction	[1]	
(ii)	Middle box ticked	[1]	
(b)	$F = ma$	[1]	
	$= 70 \times 8$	[1]	
	$= 560 \text{ (N)}$	[1]	
	$R = 700 - 560$	[1]	7
	$= 140 \text{ (N)}$	[1]	
	<i>or</i> $RF = ma$	[1]	
	$W - FF = ma$	[1]	
	$700 - FF = 70 \times 8$	[1]	
	$FF = 700 - 560$	[1]	5
	$= 140$	[1]	
9 (a)	6000 (J)	[1]	
(b)	$Ke = \frac{1}{2} m v^2$	[1]	
	$4000 = \frac{1}{2} \times 80 \times v^2$	[2]	
	$v = 10 \text{ (m/s)}$	[1]	
10 (a) (i)	The lever will not move (box ticked)	[1]	} dependent marking
(ii)	Moments are balanced	[1]	
(iii)	Nm or Ncm	[1]	
(b) (i)	Force correctly marked at c. of g.	[1]	8
(ii)	CM = ACM	[1]	
	$6 \times d = 10 \times 15$	[2]	
	$d = 25 \text{ (cm)}$	[1]	
Total			70