



*Rewarding Learning*

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

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**Double Award Science: Physics**

Unit P1

Foundation Tier

**[GSD31]**

**THURSDAY 24 MAY 2012, MORNING**

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**MARK  
SCHEME**

			AVAILABLE MARKS
1	(a) Nuclear	[1]	4
	(b) Transport Heating (Homes) Electricity (generation) Any 2, [1] each	[2]	
	(c) Nuclear	[1]	
2	(a) (i) 10 (J)	[1]	5
	(ii) KE/heat/light/sound	[1]	
	(b) Efficiency = $\frac{\text{Useful Output Energy}}{\text{Input Energy}}$	[1]	
	Eff = 640/800	[1]	
	Eff = 0.8 or 80%	[1]	
3	(a) Speed = Gradient = 200/10 = 20 (m/s)	[1] [1] [1]	6
	(b) (300 – 200) = 100 (m)	[1]	
	(c) Increase	[1]	
	(d) Zero gradient	[1]	
4	(a) C B A	[1] [1] [1]	6
	(b) Moment = Force × distance (to pivot) = 20 × 0.3 = 6 (Nm)	[1] [1] [1]	
5	(i) PE = m g h = 4 × 10 × 1.5 = 60 (J)	[1] [1] [1]	
	(ii) KE = $\frac{1}{2} mv^2$ = $\frac{1}{2} \times 4 \times 25$ = 50 (J)	[1] [1] [1]	8
	(iii) (Energy lost) as heat or sound [1] due to friction [1]	[2]	

			AVAILABLE MARKS	
6	(a) (i)	Density = Mass/Volume	[1]	
		= 210 000/200	[1]	
		= 1050 (kg/m <sup>3</sup> )	[1]	
	(ii)	Limitless or never runs out	[1]	
		Non-Polluting/conserves fossil fuels	[1]	
	(b) (i)	Power = $\frac{\text{Energy}}{\text{Time}}$	[1]	
= $\frac{900\,000}{60}$		[1]		
= 15 000(W)		[1]		
(ii) 15 (kW) allow e.c.f. from (b)(i)		[1]	9	
7	(a)	1000	[1]	
		3	[1]	
		125	[1]	
(b)	Shielding/			
	Handle sources with tongs/ Hold sources at arms length/ Minimise exposure time/put warning sign on door when sources are in use	[1]	5	
8	(a)	Atoms with same Z no. [1] but different A nos [1]	[2]	
	(b)	Nucleus contain protons + neutrons Orbiting electrons	[1] [1]	

- 9 (a) (i) A [1]
- (ii) Z [1]
- (iii) 238 [1]  
92 [1]  
146 [1]
- (iv) 1. Alpha or  $\alpha$  [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 e.g. hazardous waste will cause problems for future generations  
No polluting gases  
Safety/causes cancer
- Proliferation of N. weapons [5–6]

AVAILABLE  
MARKS

Response	Mark
Candidates must use appropriate specialist scientific terms throughout to describe fully and in a logical sequence the problems of nuclear power stating <b>5–6</b> 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.	<b>[5–6]</b>
Candidates use some appropriate specialist scientific terms throughout to partially describe and in a logical sequence the problems of nuclear power stating <b>3 or 4</b> 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.	<b>[3–4]</b>
Candidates must use limited specialist scientific terms to describe fully and in a logical sequence the problems of nuclear power stating <b>1 or 2</b> 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.	<b>[1–2]</b>
Response not worthy of credit.	<b>0</b>

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<b>10 (a)</b> 9 16	[1] [1]	<b>AVAILABLE MARKS</b>
<b>(b)</b> Scale $> \frac{1}{2}$ of h axis 4 or 5 points correct [2] } 2 or 3 points correct [1] } tolerance $\pm 1$ square	[1] [2]	
<b>(c)</b> line of best fit [1]	[1]	
<b>(d)</b> Grad = $\frac{Y_2 - Y_1}{x_2 - x_1}$ [1] Appropriate values [1] = $5 \pm 0.2$ [1] m/s <sup>2</sup> [1]	[4]	10
<b>Total</b>	<b>70</b>	