Rewarding Learning

General Certificate of Secondary Education
2011–2012

Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

THURSDAY 24 MAY 2012, MORNING

MARK SCHEME

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

					AVAILABLE MARKS
6	**(a)**	**(i)**	Density = Mass/Volume	[1]	
			= 210 000/200	[1]	
			= 1050 (kg/m^3)	[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	[1]	
			Orbiting electrons	[1]	4

AVAILABLE MARKS

9 **(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 e.g. hazardous waste will cause problems for future generations
No polluting gases
Safety/causes cancer

Proliferation of N. weapons [5–6]

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**

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