New Specification

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Double Award Science: Physics

Unit P1

Higher Tier

[GSD32]

WEDNESDAY 14 NOVEMBER 2012
1.30 pm–2.30 pm

MARK SCHEME

AVAILABLE MARKS

1 **(a)** **(i)** C [1] **(ii)** A [1] **(iii)** B [1]

(b) **(i)** Ionisation [1]

(ii) Lose or gain electron/s [1]

(c) e.g. Any two from:
Use tongs/keep distance large [1]
Keep exposure time low [1]
Use shielding/wear protection [1]/safety badge/film badge

(d) Time [1] for activity to halve [1] [dept. marking] 9

2 **(a)** Find weight (or mass and multiply by 10) [1]
Find total height of stairs [1]
Time to climb stairs [1]
Power = (weight × height)/time; [1]
Any two instruments from scales/metre stick/stop clock [2]
[1 mark each]

Response	**Mark**
Candidates give **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 is of a limited standard and they have made no use of specialist terms.	[1–2]
Response not worthy of credit.	[0]

[6]

(b) P = Work done/time taken (no marks)
= (3800)/5 [1]
= 760 [1]
= 0.76 (kW) [1] [3] 9

3 (i)

AVAILABLE MARKS

Depth h in m	0	10	20	30	40	50
W in bar	0	1	2	3	4	5
Total pressure in bar	**1**	***2***	***3***	*4*	***5***	***6***

3 or 4 correct [1]
All correct [2] [2]

(ii) Vertical axis numbered with uniform scale [1], scale more than half [1]
3 or 4 correct [1]
5 or 6 points [2] [4]

(iii) Best fit line [1]

(iv) Intercept (on vertical axis) OR when h = 0 pressure is 1 bar [1]

(v) 4.5 bar [1]

(vi) Line does not go through origin [1] 10

4 (a) (i) (Same) number of protons or charge [1]

(ii) (Different) number of neutrons or mass number [1]

(b) 14 [1] 0 [1] 7 [1] −1 [1] [4]

(c) 3 half-lives 1/8 remains [1]
Activity = 10 dis/s [1]
Decrease = 70 (dis/s) [1] [3] 9

5 (i) Two light or small nuclei [1] (must have)
form a heavier or new nucleus [1] [2]

(ii) Enormous fuel supplies (from oceans)
Or (virtually) no radioactive waste [1]

(iii) Stars/Sun [1] 4

				AVAILABLE MARKS
6	**(a)** **(i)**	24 (s)	[1]	
	(ii)	Distance = area	[1]	
		= 14 [1] × 26 [1]	[2]	
		= 364 (m) e.c.f. from **(a) (i)**	[1]	
	(b) **(i)**	Accelerating, speed increasing	[1]	
	(ii)	Constant velocity, constant speed	[1]	
	(c)	−6 (m/s) the minus is essential	[1]	8
7	**(i)**	$a = (v - u)/t$ or equivalent formula or $a = \frac{\Delta v}{t}$ $\left(\frac{\text{change in v}}{t}\right)$	[1]	
		$= (0 - 20)/8$	[1]	
		$= -2.5\ (m/s^2)$	[1]	
	(ii)	$F = m \times a$	[1]	
		$= 950 \times 2.5$ allow e.c.f. from **part (i)**	[1]	
		$= 2375$ (N)	[1]	6
8	**(i)**	Mass = 0.012 (kg)	[1]	
		= 0.12 (N)	[1]	
	(ii)	P.E. = m g h	[1]	
		$h = \frac{0.3}{0.012 \times 10}$	[1]	
		= 2.5 (m)	[1]	
	(iii)	PE = KE [1]		
		$0.3 = \frac{1}{2} \times 0.012 \times v^2$ [1] or $v^2 = \frac{0.30}{0.006}$ [1]		
		v = 7.1 [1] (m/s) or 7.07	[4]	9
		$v = \sqrt{\frac{2KE}{m}}$ [1] $= \sqrt{\frac{2 \times 0.3}{0.012}}$ [1] $= 7.1$ [1]		
		$v = \sqrt{2gh}$ [1] $= \sqrt{2 \times 10 \times 2.5}$ [2] $= 7.1$		
9	**(a)**	Object does not rotate about a point Or body is balanced Or ACWM = CWM or no resultant moment	[1]	
	(b) **(i)**	ACM = CM or $F_1d_1 = F_2d_2$	[1]	
		40×20 [1] $= R \times 50$ [1]	[2]	
		R = 16 (kN)	[1]	
	(ii)	(R) decreases	[1]	6
			Total	**70**