New Specification

Rewarding Learning

General Certificate of Secondary Education
2011–2012

Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

MONDAY 14 NOVEMBER 2011
1.30 pm–2.30 pm

MARK SCHEME

					AVAILABLE MARKS
1	(a)	(i)	Battery/cell	[1]	
		(ii)	Any **two** from: Sound, light, microwaves	[2]	
	(b)		Potential [1] – heat [1] or or gravitational thermal	[2]	5
2	(i)		distance – e.g. tape measure/trundle wheel time – stopwatch [1 each]	must have measurements to get instrument mark [4]	
	(ii)		av speed = distance/time	[1]	5
3	(a)	(i)	Efficiency = (useful) energy out/energy in [1] = 1600/2000 [1] = 0.80 [1] or 80%	[3]	
		(ii)	No unit	[1]	
	(b)		Better insulation/smaller door	[1]	5
4	(a)	(i)	Car B	[1]	
		(ii)	Biggest resultant or unbalanced force *dependent marking*	[1]	
	(b)		(a =) 2/0.5 [1] = 4 [1] m/s^2 [1]	[3]	5
5	(a)	(i)	Friction	[1]	
		(ii)	Tension	[1]	
	(b)		momentum = mass × vel [1] = 0.5 × 3 [1] = 1.5 (kgm/s) [1]	[3]	5

AVAILABLE MARKS

6 **(a)** **(i)** Plum pudding [1]

(ii) Rutherford/Bohr [1]

(b)

Particle	Where found	Charge
proton	***nucleus***	positive
neutron	nucleus	neutral
electron	in orbit	***negative***

[1] each [3] 5

7 **(a)** W = mg [1] 0.4 × 10 [1]
= 4 [1] (N) [3]

(b) **(i)** Add nails to measuring cylinder containing water [1]
Note initial and final readings [1]
Difference (gives volume) [1] [3]

(ii) density = mass/volume (or symbols) [1]
= 150/20 [1]
= 7.5 [1]
g/cm^3 [1] [4] 10

8 **(a)** **(i)** Atomic number [1] [1]

(ii) No. of protons [1] [1]

(iii) Mass number [1] [1]

(iv) No. of protons + neutrons OR number of particles (in the nucleus) [1] [1]

(b) **Indicative Content**
- Absorbs neutron or neutron strikes (U^{235} nucleus)
- Splits nucleus
- (2 or 3) (fission) neutrons produced
- (Possible) chain reaction
- Energy Released

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 limited standard.	**1–2**
Response not worthy of credit.	**0**

AVAILABLE MARKS

10

9 **(a)** **(i)** Unstable nuclei or nuclei disintegrate [1] emit particles or radiation or gamma rays [1] [2]

(ii) gamma, alpha, beta [1] each [3]

(b) Any **two** from:
e.g., radon gas from earth's crust, from space/cosmic rays building materials, food (e.g. bananas) etc. [2]

(c) **(i)** e.g. avoid cancer, radiation sickness/burns [1]

(ii) Any **two** from:
keep exposure time to a minimum
work at a distance/use forceps or tools/robots
use shielding/special clothing [2]

10

10 **(i)** $\frac{1}{2}$ mark each round up [2]

(ii) v^2 scale must be 0.5 or more of axis. [1]
Plot points: 5 correct [2], 4 correct [1] [3]

(iii) Best fit line [1] [1]

(iv) Yes [1]
Graph is a straight line [1] passing thro' origin [1] [3]

(v) k is the grad [1] [1]

10

Total **70**