

New  
Specification



*Rewarding Learning*

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

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**Double Award Science: Physics**

Unit P1

Higher Tier

[GSD32]

**MONDAY 14 NOVEMBER 2011**

**1.30 pm–2.30 pm**

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**MARK  
SCHEME**

- 1 (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  
use shielding/special clothing [2]
- 2 (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 [6]

AVAILABLE  
MARKS

10

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 <b>all</b> 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 to partially describe, in a logical sequence, <b>3 or 4</b> 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.	<b>[3–4]</b>
Candidates use limited specialist scientific terms to describe <b>1 or 2</b> of the points relating to fission shown in the indicative content above. Their spelling, punctuation, grammar, form and style are of a limited standard.	<b>[1–2]</b>
Response not worthy of credit.	<b>0</b>

10

			AVAILABLE MARKS
<b>3</b>	distance = 2 (150 + 105) [1] = 510 m [1] time = dist/vel (or equivalent formula) [1] = 510/3 [1] = 170(s) [1]	[5]	5
<b>4</b>	<b>(i)</b> $\frac{1}{2}$ mark each round down [2]  <b>(ii)</b> $v^2$ scale must be 0.5 or more of axis. [1] Plot points: 5 correct [2], 4 correct [1] [3]  <b>(iii)</b> Best fit line [1] [1]  <b>(iv)</b> Yes [1] Graph is a straight line [1] passing thro' origin [1] [3]  <b>(v)</b> k is the grad [1] [1]	[1]	10
<b>5</b>	F = ma [1] F = 1200 × 1.2 [1] F = 1440 N [1] Friction = 160 N [1]	[4]	4
<b>6</b>	$t = \frac{\Delta v}{a}$ [1] $t = \frac{24 - 2}{5.5}$ [2] t = 4(s) [1]	[4]	4
<b>7</b>	<b>(a) (i)</b> All points correctly plotted [2] (4 points – [1]) Vol scale to use 0.5 or more of axis [1] [3]  <b>(ii)</b> best fit line [1] [1]  <b>(iii)</b> Intercept on y-axis = 60(g) [1]  <b>(iv)</b> density = gradient [1] = $\frac{160 - 80}{80}$ [1] = 1 [1] = g/cm <sup>3</sup> [1] [4]	[1]	11
	<b>(b) (i)</b> No effect [1] [1]  <b>(ii)</b> Lesser slope [1] [1]	[1]	

			AVAILABLE MARKS
8	<p>(a) (i) Towards the centre (of the curve) [1]</p> <p>(ii) Keeps the car going in a curve (circle) [1]</p> <p>(iii) INCREASE [1]</p> <p>(iv) DECREASE [1]</p>	[4]	
	<p>(b) Mom = mass × velocity [1]  Mom = 1500 × 22 [1]  Mom = 33 000 [1] kgm/s [1]</p>	[4]	8
9	<p>CWM = ACWM [1]  3 × 50 [1] = W × 20 [1]  W = 7.5(N) [1]</p>	[4]	4
10	<p>pe = mgh [1]  30 [1] = 0.2 × 10 × h [1]  h = 15(m) [1]</p>	[4]	4
<b>Total</b>			<b>70</b>