



Mark Scheme (Results)

Summer 2017

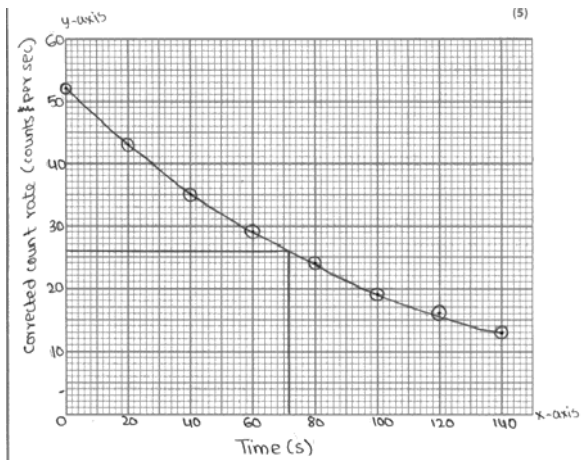
Pearson Edexcel International GCSE
in Physics (4PH0) Paper 2PR

Question number	Answer	Notes	Marks																													
1	<table><tr><th rowspan="2">Name of power station</th><th colspan="4">Type of power station</th></tr><tr><th>fossil fuel</th><th>hydroelectric</th><th>nuclear</th><th>wind turbine</th></tr><tr><td>Dinorwig</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>Drax</td><td>✓</td><td></td><td></td><td></td></tr><tr><td>Fullabrook</td><td></td><td></td><td></td><td>✓</td></tr><tr><td>Torness</td><td></td><td></td><td>✓</td><td></td></tr></table> 1 mark for each correct row ;;;;	Name of power station	Type of power station				fossil fuel	hydroelectric	nuclear	wind turbine	Dinorwig		✓			Drax	✓				Fullabrook				✓	Torness			✓		More than 1 tick (✓) in a row negates that row	4
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	fossil fuel	hydroelectric	nuclear	wind turbine																												
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Total for question = 4 marks

Question number	Answer	Notes	Marks
2 (a)	gravitational (potential energy);	allow GPE ignore gravity ignore thermal/heat potential energy	1
(b) (i)	friction; electrons; positive;	must be in this order	3
(ii)	all the hairs have the same (negative) charge; (same charges) repel;	condone positive charge allow 'like' for 'same'	2
(c)	any 3 of: MP1. metal /post conducts/eq; MP2. charge is earthed /charge flows to ground ; MP3. discharging hair/ eq; MP4. hair falls down due to its weight;	allow electrons for charge allow metal provides low resistance path allow (all) charge leaves hair /girl hair/ girl becomes neutral condone 'pulled down by (effect of) gravity'	3

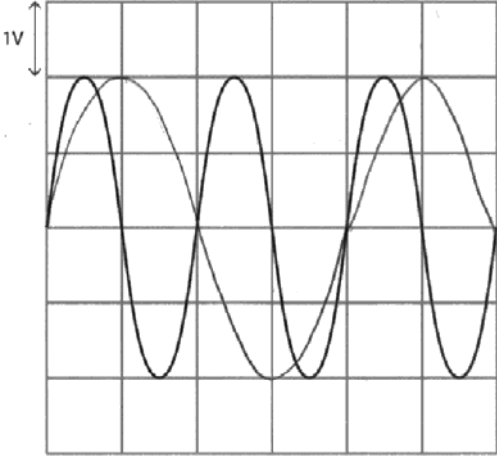
Total for question = 9 marks

Question number	Answer	Notes	Marks																		
3 (a)	MP1. same number of <u>protons</u> OR same <u>atomic number</u> ; MP2. different number of <u>neutrons</u> OR different <u>mass number</u> ;	ignore references to electrons / elements / nuclei / atoms	2																		
(b)	Any 2 of MP1. Remove source / protactinium; MP2. Measure background radiation and repeat ; MP3. Subtract background count/radiation from readings;	allow 'measure over a long period of time' determine the difference in counts	2																		
(c) (i)	suitable scale chosen (> 50% of grid used); axes labelled with quantities and unit; plotting correct to nearest half square (minus one for each plotting error);; line (curve) of best fit acceptable; 	Allow counts/s, s ⁻¹ , Bq i.e. two plotting errors = no marks for plotting i.e. smooth curve within 1 small square of each point <table><tr><th>time in seconds</th><th>count rate in counts per second</th></tr><tr><td>0</td><td>52</td></tr><tr><td>20</td><td>43</td></tr><tr><td>40</td><td>35</td></tr><tr><td>60</td><td>29</td></tr><tr><td>80</td><td>24</td></tr><tr><td>100</td><td>19</td></tr><tr><td>120</td><td>16</td></tr><tr><td>140</td><td>13</td></tr></table>	time in seconds	count rate in counts per second	0	52	20	43	40	35	60	29	80	24	100	19	120	16	140	13	5
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(ii)	evidence of correct graph use; evidence of taking more than one measurement; correct value in the range 66-73 (seconds);	e.g. construction lines at count rate of 26 e.g. additional construction lines at count rate of 13 or other pair of count rates such as 40:20	3																		

Total for question = 12 marks

Question number	Answer	Notes	Marks
4 (a) (i)	boiling;	allow evaporation	1
(ii)	MP1. idea that particles move apart; MP2. idea that particles gain (kinetic) energy; MP3. idea that particles move (more) freely;	ignore references to vibration allow molecules for particles allow spread out / take up more space may be shown on labelled diagram allow idea of moving faster ignore 'move more' allow 'bonds break' / 'break away' / 'escape surface' / 'overcome attraction' ignore unqualified 'move more' / 'move randomly'	3
(b) (i)	substitution; rearrangement; evaluation; e.g. $\frac{100}{350} = \frac{p_2}{450}$ $(p_2 =) \frac{100 \times 450}{350}$ $(p_2 =) 130 \text{ (kPa)}$	no mark for formula as seen on QP page 2 rearrangement and substitution in either order $p_1 \times T_2 = p_2 \times T_1$ $p_1 = \frac{p_2 \times T_1}{T_2}$ allow 129, 128.6 etc correct answers without working gain 3 marks truncated answers e.g. 128 gains 2 marks only 230 gains 1 mark	3
(ii)	straight line with same positive gradient throughout; line passes through the origin (if extended);	mark independently judge by eye	2

Total for question = 9 marks

Question number	Answer	Notes	Marks
5 (a)	A (20 Hz – 20,000 Hz); The only correct answer is A B is not correct because 25,00 Hz is too high for humans to hear C is not correct because humans can hear below 200Hz D is not correct because 25,00 Hz is too high for humans to hear and humans can hear below 200Hz		1
(b) (i)	calculation of time period; use of $f = 1/T$; evaluation; e.g. (time period / T) = 0.010 (s) (f =) $1/0.010$ (f =) 100 (Hz)	allow ecf for incorrect T allow 0.01 seen anywhere 200 (Hz), 33(.3) (Hz) for 2 marks	3
(ii)	line drawn has similar amplitude to existing line; line drawn has a smaller frequency; 		2

Total for question = 6 marks

Question number	Answer	Notes	Marks
6 (a) (i)	any sensible suggestion; e.g. newtonmeter / balance / scale(s)	accept (electronic) scale condone newtonmetre ignore weighing machine	1
	(ii) weight = mass x gravitational field strength;	allow in standard symbols or in words e.g. $W = m \times g$ allow a 'mixture' e.g. weight = mass x g reject 'gravity' for g	1
	(iii) substitution OR rearrangement; evaluation; e.g. $50 = m \times 10$ (m =) 5 (kg)	 allow use of $g = 9.81$ N/kg 5.1(kg) from $g = 9.81$ accept correct answer with no working for both marks	2
(b)	MP1. use of density = mass/volume; MP2. measure volume (of cannonball); MP3. further volume measurement detail; e.g. volume of cannonball= volume of water displaced OR measure diameter AND calculate volume of sphere	allow 'find out' for measure allow radius for diameter $v = \frac{4}{3} \pi r^3$ for volume	3
(c)	any 3 of: MP1. Momentum = mass x velocity; MP2. momentum before (firing) is zero; MP3. momentum is conserved; MP4. idea that after firing cannon must have equal and opposite <u>momentum</u> to cannonball;	ignore references to Newton's laws $p = m \times v$ momentum before = momentum after $0 = m_1 \times v_1 - m_2 \times v_2$ (v taken in the direction of the arrows on the diagram)	3

Total for question = 10 marks

Question number	Answer	Notes	Marks
7 (a)	digital: only set values allowed; analogue: any value allowed / continuously variable;	allow in diagrams or words ignore references to quality, regeneration, range, information density allow idea of binary, on-off, OR 1-0 for digital signal	2
(b)	MP1. use of correct distance OR doubling time(at end of calculation); MP2. conversion from mm to m; MP3. substitution OR rearrangement; MP4. evaluation; e.g. (distance =) 4.2 (mm) (distance =) 0.0042 (m) $2.8 \times 10^8 = \frac{0.0042}{\text{time}}$ (time =) 1.5×10^{-11} (seconds)	seen anywhere 4.2×10^{-3} (m) time = $\frac{4.2 \times 10^{-3}}{2.8 \times 10^8}$ 1.5×10^{-11} (s) gets 4 marks 7.5×10^{-12} gets 3 allow POT error as unit conversion error for -1 e.g. 1.5×10^{-9} (s) gets 3 marks 7.5×10^{-11} gets 2	4

(c)	any 4 of: MP1. current (in coil /wire) is alternating / changing direction / varying; MP2. the coil / wire has a (changing) magnetic field; MP3. magnetic field of (permanent) magnet and of coil interact; MP4. producing a force (which changes direction) on the coil; MP5. causing loudspeaker cone to vibrate; MP6. vibrations transferred to air;	ignore references to RH rule or LH rule allow mention of a.c. ignore 'coil/ wire is electromagnet' condone 'fields overlapping' ignore 'cutting field' allow 'coil is attracted/repelled by permanent magnet' allow paper tube for loudspeaker cone	4
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Total for question = 10 marks