



Mark Scheme (Results)

January 2018

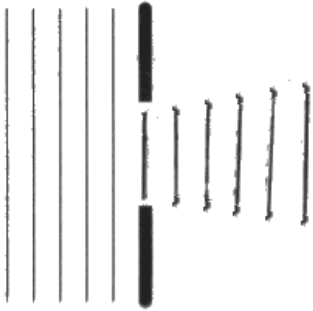
Pearson Edexcel International GCSE
In Physics (4PH0) Paper 2P

Question number	Answer	Notes	Marks														
1 (a)	one mark for each correct tick;;; <table border="1"><thead><tr><th>Energy source</th><th>Tick</th></tr></thead><tbody><tr><td>wind</td><td></td></tr><tr><td>oil</td><td>✓</td></tr><tr><td>coal</td><td>✓</td></tr><tr><td>geothermal</td><td></td></tr><tr><td>bio-gas</td><td></td></tr><tr><td>nuclear</td><td>✓</td></tr></tbody></table>	Energy source	Tick	wind		oil	✓	coal	✓	geothermal		bio-gas		nuclear	✓	2 marks max. if 4 ticks 1 mark only if 5 ticks 0 marks if 6 ticks	3
Energy source	Tick																
wind																	
oil	✓																
coal	✓																
geothermal																	
bio-gas																	
nuclear	✓																
(b)	advantage: any one from • high energy density / eq; • short start up time / adaptable to demand; • reliable technology; • does not depend on weather conditions; • (relatively) cheap; disadvantage: any one from • produces CO₂ / greenhouse gases / air pollution / sulphur dioxide / nitrous oxide; • causes global warming; • causes acid rain;	ignore ideas about transportation allow 'produces large amount of energy' ignore non-renewable ignore unqualified 'damages environment', 'pollution' etc.	2														

Total for question 1 = 5 marks

Question number	Answer	Notes	Marks																								
2 (a) (i)	power = voltage x current;	allow rearrangements and use of standard symbols e.g. $P = V \times I$ do not allow c/C/A for current	1																								
(ii)	substitution; rearrangement; evaluation; e.g. $6.5 = 230 \times I$ $(I =) 6.5 / 230$ $(I =) 0.028 \text{ (A)}$	allow 0.03, 0.0283, 0.02826... (A) do not allow 0.02 (A)	3																								
2 (b)	1 mark for each correct;;; <table border="1"> <thead> <tr> <th>S1</th><th>S2</th><th>S3</th><th>Lamp</th></tr> </thead> <tbody> <tr> <td>up</td><td>up</td><td>up</td><td>on</td></tr> <tr> <td>down</td><td>down</td><td>down</td><td>off</td></tr> <tr> <td>up</td><td>up</td><td>down</td><td>off</td></tr> <tr> <td>down</td><td>up</td><td>up</td><td>off</td></tr> <tr> <td>up</td><td>down</td><td>down</td><td>on</td></tr> </tbody> </table>	S1	S2	S3	Lamp	up	up	up	on	down	down	down	off	up	up	down	off	down	up	up	off	up	down	down	on		3
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Total for question 2 = 7 marks

Question number	Answer	Notes	Marks
3 (a)	left diagram: at least 3 correctly curved wavefronts centred on the gap; spacing of wavefronts is consistent with original wavefronts;  right diagram: evenly spaced planar wavefronts (curved at the edges); 	ignore where wavefront lines start and finish DOP judge spacing by eye reject if any wavefront line is as long as original wavefront lines ignore spacing of wavefronts	3
(b) (i)	(wave) speed = frequency x wavelength;	allow rearrangements and use of standard symbols e.g. $v = f \times \lambda$ condone s for speed	1
(ii)	substitution / rearrangement; evaluation of frequency; evaluation of wavelength to at least 2 significant figures; e.g. $6.0 = f \times 4.0$ $f = 1.5 \text{ (Hz)}$ $(\lambda_2 =) 2.7 \text{ (cm)}$	allow alternative methods e.g. $6 / 4 = 4 / \lambda$ gains both method marks allow 2.67, 2.6 recurring condone 2.6, 2.66 etc. do not allow 3.0	3

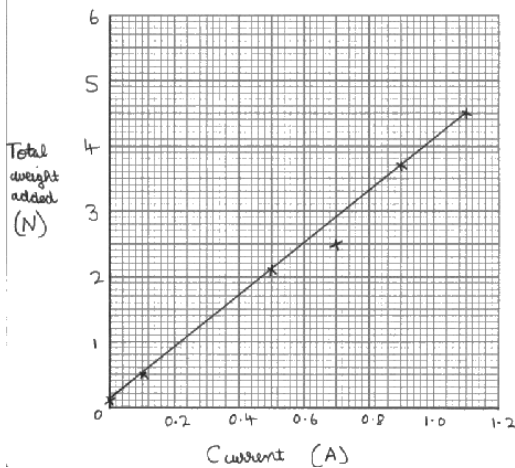
Total for question 3 = 7 marks

Question number	Answer	Notes	Marks
4 (a)	(total) momentum before (a collision) = (total) momentum after (a collision);	ignore unqualified 'momentum is conserved'	1
(b)	correct value of momentum before collision seen anywhere in the calculation; substitution into balanced equation; evaluation of velocity; e.g. (momentum before =) 1.6 (kgm/s) $1.6 = 0.16 \times 8 + 0.16 \times v$ (v =) 2 (m/s)	either as 0.16×10 or 1.6	3
(c)	calculation of KE before collision; calculation of KE of either ball after collision; evaluation of energy difference; e.g. $0.5 \times 0.16 \times 10^2$ $(0.5 \times 0.16 \times 8^2)$ OR $(0.5 \times 0.16 \times 2^2)$ $(8 - (5.12 + 0.32) =) 2.6$ (J)	ecf from (b) 8 (J) 5.12 OR 0.32 (J) allow 2.56 (J)	3

Total for question 4 = 7 marks

Question number	Answer	Notes	Marks
5 (a)	any 4 from: MP1. fewer particles outside the balloon; MP2. (hence) fewer impacts (per second) on the outside of the balloon; MP3. (hence) pressure outside balloon is reduced; MP4. pressure inside balloon > pressure outside balloon; MP5. (hence) air inside the balloon expands until the pressures balance;	condone idea that all particles have been removed ignore references to vacuum reject 'air particles expanding'	4
(b) (i)	pressure increases; (because) volume (of trapped air) has decreased / particles collide with liquid surface more (often);	allow walls for liquid surface	2
(ii)	water level increases / rises; greater {force / pressure} acts on the water (so can support greater weight of water above);	allow formula as justification $p = h\rho g$ (because the increased pressure difference supports a greater height of water)	2
(iii)	water level decreases / falls; (because) pressure difference is now less/eq;		2

Total for question 5 = 10 marks

Question number	Answer	Notes	Marks														
6 (a)	either correct moment seen; use of principle of moments; correct evaluation of weight; e.g. $W \times 8$ OR 0.1×12 $W \times 8 = 0.1 \times 12$ (W =) 0.15 (N)	seen mathematically or in writing e.g. 'clockwise moment = anticlockwise moment' answer of 0.25 (N) gets 2 marks allow 0.2 (N) if supported by correct working	3														
(b)	coil becomes an electromagnet / coil produces a magnetic field; coil {attracts / exerts a force on} magnet; increasing anti-clockwise moment;	allow current for coil reject if repulsion mentioned allow creating (additional) anti-clockwise moment	3														
(c) (i)	sensible linear scales on both axes that occupy >50% of the grid; both axes labelled correctly with quantity and unit; correct orientation; all 6 points correctly plotted; 	allow symbols I for current and W for weight current on x-axis reject plotting mark if non-linear scale used in region of plots <table><thead><tr><th>Current in A</th><th>Total weight added in N</th></tr></thead><tbody><tr><td>0.0</td><td>0.1</td></tr><tr><td>0.1</td><td>0.5</td></tr><tr><td>0.5</td><td>2.1</td></tr><tr><td>0.7</td><td>2.5</td></tr><tr><td>0.9</td><td>3.7</td></tr><tr><td>1.1</td><td>4.5</td></tr></tbody></table>	Current in A	Total weight added in N	0.0	0.1	0.1	0.5	0.5	2.1	0.7	2.5	0.9	3.7	1.1	4.5	4
Current in A	Total weight added in N																
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0.7	2.5																
0.9	3.7																
1.1	4.5																
(ii)	straight line of best fit avoiding anomalous reading;		1														
(iii)	(repeat to) check accuracy / validity of reading; (because) reading appears to be anomalous;	allow idea of checking to see if same reading obtained again allow reading does not follow the trend / does not lie near the line of best fit	2														

(iv)	pattern statement e.g. as current increases the force increases; suitable comment about linearity;	ignore references to weight allow (directly) proportional	2
(v)	relevant use of one set of data from graph or table; 8.1 (N);	exclude data from 0.7A reading allow ecf from line on graph allow answers that round to 8.1 (N)	2

Total for question 6 = 17 marks

Question number	Answer	Notes	Marks
7 (a)	(i) measuring cylinder;	allow graduated cylinder, burette, pipette, syringe	1
	(ii) 0.005 (cm ³)		1
(b)	(i) correctly calculated average; given to 3 significant figures; e.g. (average =) 300.8 (mm) (average to 3 s.f. =) 301 (mm)	DOP	2
	(ii) use of radius in calculation; substitution and rearrangement; evaluation; e.g. radius = 150(.4) (mm) (length =) $1.0 / (\pi \times 150.4 \times 150.4)$ (length =) 1.4×10^{-5} (mm)	allow ecf from (b)(i) throughout seen anywhere -1 for POT error answer of 3.5×10^{-6} (mm) gains 2 marks for using diameter instead of radius allow answers that round to 1.40-1.41	3

Total for question 7 = 7 marks