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Mark Scheme (Results)

January 2018

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

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>1 (a)</td><td>one mark for each correct tick;;;

<table><tr><th>Energy source</th><th>Tick</th></tr><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></table></td><td>2 marks max. if 4 ticks
1 mark only if 5 ticks
0 marks if 6 ticks</td><td>3</td></tr>
<tr><td>(b)</td><td>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 CO_2 / greenhouse gases / air pollution / sulphur dioxide / nitrous oxide;
• causes global warming;
• causes acid rain;</td><td>ignore ideas about transportation
allow ‘produces large amount of energy’

allow non-renewable
ignore unqualified ‘damages environment’, ‘pollution’ etc.</td><td>2</td></tr>
</table>

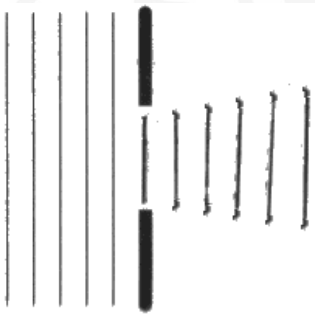
Total for question 1 = 5 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>2 (a) (i)</td><td>power = voltage x current;</td><td>allow rearrangements and use of standard symbols e.g. P = V x I
do not allow c/C/A for current</td><td>1</td></tr>
<tr><td>(ii)</td><td>substitution;
rearrangement;
evaluation;

e.g.
6.5 = 230 x I
(I =) 6.5 / 230
(I =) 0.028 (A)</td><td>

allow 0.03, 0.0283, 0.02826… (A)
do not allow 0.02 (A)</td><td>3</td></tr>
<tr><td>2 (b)</td><td>1 mark for each correct;;;
<table>
<tr><th>S1</th><th>S2</th><th>S3</th><th>Lamp</th></tr>
<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>
</table></td><td></td><td>3</td></tr>
</table>

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 x 4.0 f = 1.5 (Hz) (λ_2 =) 2.7 (cm)	allow alternative methods e.g. 6 / 4 = 4 / λ gains both method marks allow 2.67, 2.6 recurring condone 2.6, 2.66 etc. do not allow 3.0	3

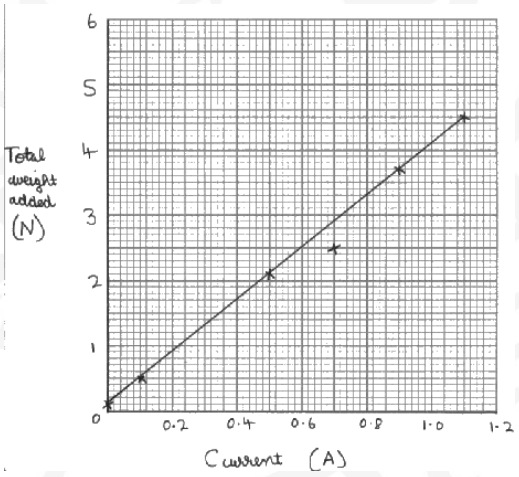
Total for question 3 = 7 marks

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 x 8 + 0.16 x v (v =) 2 (m/s)	either as 0.16 x 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 x 8 OR 0.1 x 12 W x 8 = 0.1 x 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 **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
(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 / (π x 150.4 x 150.4) (length =) 1.4 x 10^{-5} (mm)	allow ecf from (b)(i) throughout seen anywhere -1 for POT error answer of 3.5 x 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

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