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Mark Scheme (Results)

Summer 2012

International GCSE
Physics (4PH0) Paper 2P

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Summer 2012
Publications Code UG032772

INTERNATIONAL GCSE PHYSICS PAPER 2P – SUMMER 2012

Question number	Answer	Accept	Reject	Marks
1 (a) (i)	C (planet);			1
(ii)	A (comet);			1
(b)	C (gravitational force);			1

Total 3 marks

Question number	Answer	Accept	Reject	Marks
2 (a) (i)	3;	Three /3.0		1
(ii)	0.002 (s) / 2ms ; 500 (Hz) / 0.5kHz	0.001 ecf only if 2ai=6 correct answer without working for 2 marks 1000 ecf only if 2ai =6		2
(b)	All of waves at smaller amplitude (can vary); All of complete waves at higher frequency (can vary);	Any wave form Accept two diagrams that clearly show the candidate's intention		2

Total 5 marks

Question number	Answer	Accept	Reject	Marks
3 (a)	Line that shows direction of the magnetic force/field;	Line that shows the way a compass would point Line from (N) pole to (S) pole Ignore Line between poles		1
(b) (i)	Arrows on two or more lines from N to S and/or clockwise on loops around wire;	Accept arrows beside lines showing correct directions	Contradicting arrows (i.e. one correct and one incorrect)	1
(ii)	Arrow horizontal (by eye) ; Pointing to the right;	Arrow not passing through wire Unlabelled arrow if clear		2
(c)	Field (in square) is not uniform; Field direction is constant / field lines are parallel/same direction;	Ignore lines are straight Field is stronger towards the right /nearer the wire / where the lines are close together ORA for 2 marks		2

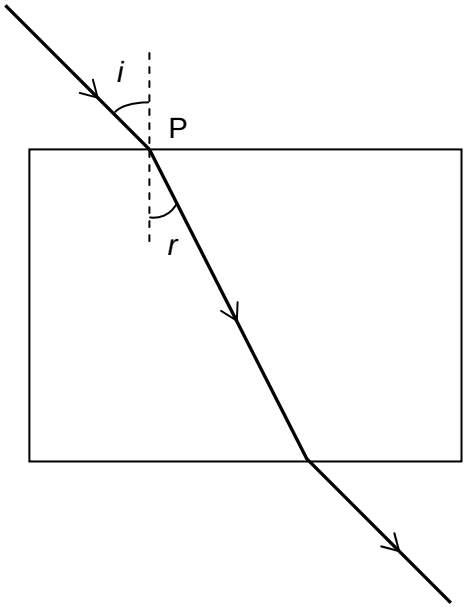
Total 6 marks

Question number	Answer	Accept	Reject	Marks
4 (a) (i)	Anomaly clearly identified (20.44 mm);			1
(ii)	Averaging seen /162.7÷8 /142.26 ÷7; Anomaly excluded/ ÷7 seen ; Final answer rounded to 2 decimal places; e.g.: 20.32 (mm)	Ignore sig figs in working Allow full marks for correct answer, no working, i.e.: 20.32 (mm) = 3 marks If no working accept these other bald answers: 20.3228.. etc (mm)= 2 marks 20.34 (mm) = 2 marks 20.3375.. (mm) = 1 mark 20.33 (mm) = 1 mark		3

Question number	Answer	Accept	Reject	Marks
4 (b)	Any two of: Yes / No (no mark) MP1 Good way of measuring small values / Measures a larger value; MP2 Taking a larger measurement might reduce (%) errors; MP3 Not actually measuring what is required (a particular coin); MP4 Possible to make a maths error e.g. when dividing / counting /rounding; MP5 Not all coins are necessarily the same / idea of anomalous coin / bent / worn;	Accept reverse arguments Ignore comments about human error Ignore reference to caliper precision Ignore comments about gaps		2

Question number	Answer	Accept	Reject	Marks
4 (c)	Any three of: MP1Measure/find <u>mass</u>; MP2 Using a named instrument - e.g. (top pan) balance, scale(s); MP3 A sensible experimental precaution: e.g. Repeat readings / measure mass of several of coins and divide/ check balance zero; MP4 Formula to use (density = mass ÷ volume); MP5 A correct <u>density</u> unit mentioned (e.g. kg/m^3);	Ignore information about calculating or finding volume Accept "Weighing" to find <u>mass</u> Ignore measuring weight Ignore volume = $\pi r^2 h$		3

Total 9 marks

Question number	Answer	Accept	Reject	Marks
5 (a)	Refraction into glass towards the normal (r > 0); Angle of incidence <u>and</u> angle of refraction both labelled correctly at the same surface; Refraction at the lower surface into air away from the normal; Emergent ray parallel to incident ray after correct refraction (by eye);  	Accept dotted lines Ignore any reflections Ignore a second incorrectly labelled pair		4

<table>
<tr><th>Question number</th><th>Answer</th><th>Accept</th><th>Reject</th><th>Marks</th></tr>
<tr><td>5 (b) (i)</td><td>One mark for either sin i or sin r correct;

<table><tr><td>i</td><td>60°</td></tr><tr><td>r</td><td>34°</td></tr><tr><td>sin i</td><td>0.87</td></tr><tr><td>sin r</td><td>0.56</td></tr></table></td><td>sin i = 0.866;
sin i = 0.8660;
sin r = 0.559;
sin r = 0.5592;

Ignore degree sign

Ignore any other values</td><td></td><td>1</td></tr>
<tr><td>(ii)</td><td>n = sin i ÷ sin r;</td><td>Accept
refractive index = sin i ÷sin r</td><td></td><td>1</td></tr>
<tr><td>(iii)</td><td>Two marks for correct answer
Refractive index = 1.55;;
Or
Refractive index = 1.6;;
Or
Refractive index = 1.5;;</td><td>Accept for one mark only any other value in the range
1.5 < n < 1.6;
Any power of 10 error, e.g. 155.36;</td><td></td><td>2</td></tr>
</table>

Question number	Answer	Accept	Reject	Marks
5 (c)	Any three of: MP1 any mention of repetition / take an average of readings; MP2 vary *i* to obtain more values ; MP3 plot a graph of sin i against sin r ; OR Calculate/work out/ find n; MP4 find gradient of graph ; OR Calculate average of n; MP5 sensible experimental precaution / improvement to method (e.g. mark lines on paper, thinner beam, fix block firmly in position, remove anomalies, sharper pencil, use a more precise protractor e.g. ½º);	Ignore reference to critical angle Ignore second glass block Ignore different colours		3

Total 11 marks

Question number	Answer	Accept	Reject	Marks
6 (a) (i)	voltage = current x resistance;	V = I x R Accept rearrangements		1
(ii)	Substitution and rearrangement (of correct equation); Answer given to at least 3 s.f.; e.g. 230 / 22 = 10.45 (A) (≈ 10 A)	Ignore calculations of voltage or resistance 10.5 A (= 10 A)		2
(b) (i)	Any two of: MP1 As a safety device / reduces danger /reduces hazards; MP2 In case of fault / short; MP3 Idea of excessive current; MP4 Prevents (wires or appliance) overheating/fire;	Ignore any reference to electric shock More than 13A		2 2
(ii)	MP1 Because total current (in motor and heater) is more than 2A; MP2 A 2 A fuse would blow / melt / would need to be replaced / circuit would be broken;	Accept reverse arguments		

Total 7 marks

Question number	Answer	Accept	Reject	Marks
7 (a) (i)	Work done = force x distance (in direction of force);	W = F x d d = W / F F = W / d		1
(ii)	Substitution (in correct equation); Answer; e.g.: W = 1.7 x 0.46 = 0.78 (J);;	 0.782		2
(iii)	Response must match 7a(ii) ; e.g. 0.78 ;	Accept word answer e.g. "the same"		1
(b) (i)	KE is zero /less / decreased;	No KE The KE is transferred (to other forms)		1
(ii)	Centre of gravity is lower;	Centre of mass is lower Height is lower <u>and</u> reference to mgh		1

Total 6 marks

Question number	Answer	Accept	Reject	Marks
8	An explanation including any five of these ideas (in any order): MP1 alpha particles have less penetrating power /less range ; MP2 alphas have more charge; MP3 alphas cause more ionization; MP4 alphas are bigger / have more mass; MP5 (slowing) force on alpha particles is larger; MP6 (kinetic) energy of alpha lost quickly causing ionization; MP7 (larger) alpha particles are more likely to collide with atoms;	Accept reverse arguments, e.g. beta particles have more penetrating power etc Ignore comparisons of energy/ velocity/ momentum		5

Total 5 marks

Question number	Answer	Accept	Reject	Marks
9 (a) (i)	momentum = mass x velocity;			1
(ii)	Substitution into correct equation; Calculation; e.g. momentum = 0.15 x 6 = 0.9;; Unit: kg m/s;	kg ms^{-1} Ns		3
(iii)	0.9 = (0.15 + 0.05) x v; v = 0.9 ÷ 0.2 = 4.5 (m/s);	Ecf from 8(a) (ii) (i.e. answer for 8aii ÷ 0.2 or answer for 8aii x 5)		2
(b)	The student is wrong; Because variables are not controlled; e.g. mass of cloth different, mass of (other) tins different, cloth velocity not measured	Student is right if the mass of the second cloth is 0.3 kg;; Student is right if the momentum of the second cloth is 1.8 kg m/s;; (assuming all tins are 0.05 kg/ throws new cloth with exactly the same velocity)		2

Total 8 marks

PAPER TOTAL: 60 MARK

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