

# Mark Scheme (Results)

Summer 2012

International GCSE

Physics (4PH0) Paper 2P

Edexcel Level 1/Level 2 Certificate

Physics (KPH0) Paper 2P

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**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

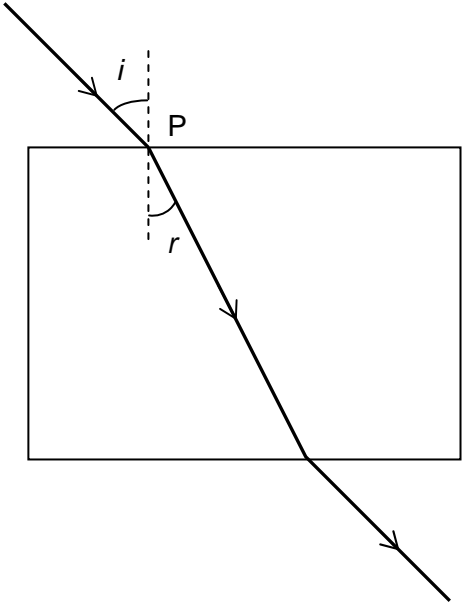
**Total 6 marks**

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)	<p>Ignore sig figs in working</p> <p>Allow full marks for correct answer, no working, i.e.: 20.32 (mm) = 3 marks</p> <p>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</p>		3

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

Question number	Answer	Accept	Reject	Marks
4 (c)	<p>Any three of:</p> <p>MP1 Measure/find <u>mass</u>;</p> <p>MP2 Using a named instrument - e.g. (top pan) balance, scale(s);</p> <p>MP3 A sensible experimental precaution: e.g. Repeat readings / measure mass of several of coins and divide/ check balance zero;</p> <p>MP4 Formula to use (density = mass ÷ volume);</p> <p>MP5 A correct <u>density</u> unit mentioned (e.g. kg/m<sup>3</sup>);</p>	<p>Ignore information about calculating or finding volume</p> <p>Accept "Weighing" to find <u>mass</u></p> <p>Ignore measuring weight</p> <p>Ignore volume = <math>\pi r^2 h</math></p>		3

**Total 9 marks**

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



Question number	Answer	Accept	Reject	Marks								
5 (b) (i)	One mark for <b>either</b> sin <i>i</i> or sin <i>r</i> correct; <table border="1" data-bbox="483 316 1099 555" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><i>i</i></td> <td style="text-align: center;">60°</td> </tr> <tr> <td style="text-align: center;"><i>r</i></td> <td style="text-align: center;">34°</td> </tr> <tr> <td style="text-align: center;">sin <i>i</i></td> <td style="text-align: center;"><b>0.87</b></td> </tr> <tr> <td style="text-align: center;">sin <i>r</i></td> <td style="text-align: center;"><b>0.56</b></td> </tr> </table>	<i>i</i>	60°	<i>r</i>	34°	sin <i>i</i>	<b>0.87</b>	sin <i>r</i>	<b>0.56</b>	sin <i>i</i> = 0.866; sin <i>i</i> = 0.8660; sin <i>r</i> = 0.559; sin <i>r</i> = 0.5592;  Ignore degree sign  Ignore any other values		1
<i>i</i>	60°											
<i>r</i>	34°											
sin <i>i</i>	<b>0.87</b>											
sin <i>r</i>	<b>0.56</b>											
(ii)	n = sin <i>i</i> ÷ sin <i>r</i> ;	Accept refractive index = sin <i>i</i> ÷ sin <i>r</i>		1								
(iii)	Two marks for correct answer Refractive index = 1.55;; Or Refractive index = 1.6;; Or Refractive index = 1.5;;	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;		2								

Question number	Answer	Accept	Reject	Marks
5 (c)	<p>Any three of:</p> <p>MP1 any mention of repetition / take an average of readings;</p> <p>MP2 vary <math>i</math> to obtain more values ;</p> <p>MP3 plot a graph of <u><math>\sin i</math> against <math>\sin r</math></u> ; OR Calculate/work out/ find <math>n</math>;</p> <p>MP4 find gradient of graph ; OR Calculate average of <math>n</math>;</p> <p>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. <math>\frac{1}{2}^\circ</math>);</p>	<p>Ignore reference to critical angle</p> <p>Ignore second glass block</p> <p>Ignore different colours</p>		3

**Total 11 marks**

Question number	Answer	Accept	Reject	Marks
6 (a)	(i) voltage = current x resistance;	$V = I \times R$ Accept rearrangements		1
	(ii) Substitution and rearrangement (of correct equation); Answer given to at least 3 s.f.; e.g. $230 / 22$ $= 10.45 \text{ (A)} \quad (\approx 10 \text{ A})$	Ignore calculations of voltage or resistance  $10.5 \text{ A (= 10 A)}$		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
	(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		2

**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	<p>An explanation including any five of these ideas (in any order):</p> <p>MP1 alpha particles have less penetrating power /less range ;</p> <p>MP2 alphas have more charge;</p> <p>MP3 alphas cause more ionization;</p> <p>MP4 alphas are bigger / have more mass;</p> <p>MP5 (slowing) force on alpha particles is larger;</p> <p>MP6 (kinetic) energy of alpha lost quickly causing ionization;</p> <p>MP7 (larger) alpha particles are more likely to collide with atoms;</p>	<p>Accept reverse arguments, e.g. beta particles have more penetrating power etc</p> <p>Ignore comparisons of energy/ velocity/ momentum</p>		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 <sup>-1</sup> 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 8a(ii) ÷ 0.2 or answer for 8a(ii) 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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