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Mark Scheme (Results)

January 2014

International GCSE
Physics (4PH0) Paper 2P

Edexcel Level 1/Level 2 Certificates
Physics (KPH0) 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.

Question number	Answer	Notes	Marks
1 (a) (i)	B (53)		1
(ii)	D (131)		1
(b)	Any two of - MP1 Beta is (moderately) ionising; MP2 Beta has a short range; MP3 idea that I-131 has a short half-life; MP4 idea that iodine is absorbed (easily) by the thyroid; MP5 (hence) reduces damage to healthy cells; MP6 (hence) does not penetrate out of the body; MP7 (therefore) kills (only) tumour cells;	Ignore I-131 is radioactive, it emits beta	2

Total 4 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>2 (a)

(b)</td><td>Similarity - both have magnitude/OWTTE;
Difference - vector has direction OR scalar does not have direction;

<table><tr><td>Quantity</td><td>Scalar</td><td>Vector</td></tr><tr><td>Density</td><td></td><td></td></tr><tr><td>energy</td><td></td><td></td></tr><tr><td>force</td><td></td><td></td></tr><tr><td>momentum</td><td></td><td></td></tr><tr><td>speed</td><td></td><td></td></tr><tr><td>velocity</td><td></td><td></td></tr></table>One or two correct ticks = 1 mark
Three or four correct ticks = 2 marks
All five correct ticks = 3 marks</td><td>

Ignore density (already completed)</td><td>2

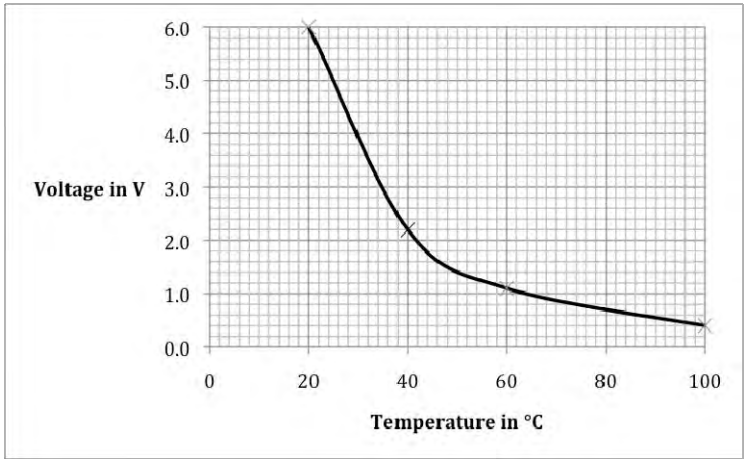
3</td></tr>
</table>

Total 5 marks

Question number	Answer	Notes	Marks
3 (a) (i)	smoke particles in air (in smoke cell) OR pollen on water OR dust particles in air;	Accept correct description of Brownian motion applied to unspecified particles in a suitable medium	1
(ii)	Any two of - MP1 Idea that tiny/smaller particles are hitting; MP2 Larger (observed) particles are moved; MP3 Idea of random motion of larger particles;	Allow zig-zag movement	2
(b)	Any six ideas about arrangement and motion of particles Max 2 for each state	Accept same ideas shown in labelled diagrams	max 6
	Solid – Regular pattern OR close packed; Vibration in position; Little space between particles;	Condone fixed position	
	Liquid – Irregular pattern; Able to move over/past other particles; Little space between particles;	Condone no fixed position Ignore vibration relating to liquid	
	Gas – No pattern; Able to move freely/fast; Larger space between particles;	Condone no fixed position Ignore vibration relating to gas	

Total 9 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>4 (a)</td><td>Any three of -
MP1 use a stirrer / stir with thermometer;
MP2 centralise / spread heat source;
MP3 move thermistor and thermometer to same level;
MP4 move thermistor and thermometer closer together;
MP5 Use thermometer with finer scale / digital thermometer;</td><td>Ignore repeat readings

Assume horizontal separation meant</td><td>Max 3</td></tr>
<tr><td>(b)</td><td>(milli)Ammeter;</td><td>Allow ampmeter</td><td>1</td></tr>
<tr><td>(c) (i)</td><td>Scale; (at least half the grid)
Axes labelled including units;
Plotting ±½ small square;;
Line of best fit;
 
</td><td>Accept axes reversed
-1 each plotting error, minimum 0 for plotting
Curve through either (80, 0.2) or (100, 0.4)
Allow line bisecting these two points
<table><tr><th>Temperature in °C</th><th>Voltage in V</th></tr><tr><td>20</td><td>6.0</td></tr><tr><td>40</td><td>2.2</td></tr><tr><td>60</td><td>1.1</td></tr><tr><td>80</td><td>0.2</td></tr><tr><td>100</td><td>0.4</td></tr></table></td><td>5</td></tr>
<tr><td>(c) (ii)</td><td>DOP (80, 0.2) circled (if supported by line of best fit)</td><td>Allow (100, 0.4) circled if supported by line of best fit</td><td>1</td></tr>
</table>

Question number	Answer	Notes	Marks
4 (d) (i)	voltage = current x resistance;	Accept rearrangements and symbols e.g. current = voltage ÷ resistance, V=IR, R=V/I	1
(ii)	Substitution into correctly rearranged equation; Conversion between amps and milliamps; Calculation yielding value correct to at least 2 s.f.; e.g. I = 5.9 ÷ 680 = 0.00868 (A) = 8.7 (mA)	 Accept x 1000 in calculation Allow 1 mark max if response is only a successful reverse argument leading to 5.8 V or 5.78 V	3

Total 14 marks

Question number	Answer	Notes	Marks
5	any four from - MP1 momentum reduced; MP2 by same amount; MP3 over longer time; MP4 so force reduced; MP5 use of “force = rate of change of momentum”; MP6 less force means less damage/injuries;	Responses should be in the context of momentum ignore “momentum absorbed” ignore “impact reduced” simple mention of eqn is insufficient	max 4

Total 4 marks

Question number	Answer	Notes	Marks
6 (a) (i)	set-up showing any **two** from- clear indication of equipment needed; correct refraction at one surface of glass block shown; protractor shown in use;	 ray-box or pins Allow ruler for apparent depth method	2
(ii)	angle of incidence; angle of refraction; OR critical angle; idea of grazing emergence;	Allow apparent depth method, i.e. real depth; apparent depth; Accept for two marks	2
(iii)	find sin i and sin r; refractive index is the ratio of sines; OR find sin c; refractive index is 1/ sin c;	• (n =) sin i/sin r • (n =) 1/ sin c • graph of sin i vs sin r Allow refractive index = real depth ÷ apparent depth for two marks	2
(b) (i)	Diagram – reflection at first back surface; reflection at second back surface;	judge by eye • straightness of ray and correctness of angle • emergent ray parallel to incident ray	2
(ii)	Refracted / slows down / wavelength decreases	Ignore: direction change ideas it does nothing / nothing happens	1

Total 9 marks

Question number	Answer	Notes	Marks
7 (a)	Rods magnetised; And repel;	 Reject ideas of charge for one mark only	2
(b)	MP1. A named magnetic material e.g.(soft) iron; MP2. because the material is capable of being magnetised; MP3. DOP (iron only) but does not retain its magnetism;	ACCEPT steel, mu-metal, nickel, cobalt accept RA steel would stay magnetised/apart	3
(c)	any two from- MP1. field (in coil) switches polarity; MP2. field (in rods) weaker; MP3. (since) field alternates with current or at 50 Hz; MP4. rods may not have time to become fully magnetised;	 allow • 100 times a second or mains frequency • hysteresis ideas • domain theory • reluctance ideas	2

Total 7 marks

Question number	Answer	Notes	Marks
8 (a)	weight of (the) plank		1
(b) (i)	moment = force x (perpendicular) distance (from pivot)		1
(ii)	substitution; final value; e.g. 1200 x 0.75 900 (Nm)		2
(c)	principle of moments (stated or implied); correct calculation of distance from hand to pivot; calculation of total anticlockwise moment; final value; e.g. (F x 2.25) + (200 x 0.75) = (1200 x 0.75) F = 330 (N)	Allow ecf from (b) 2.25 (m) seen in working (F x 2.25) + (200 x 0.75) Allow 333 N	4

Total 8 marks

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