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Mark Scheme (Results)

January 2016

International GCSE
Physics (4PH0) Paper 2P

Pearson Edexcel Certificates in
Physics (KPH0) Paper 2P

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General Marking Guidance

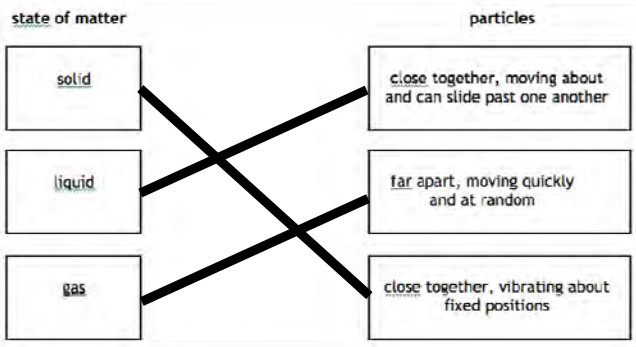
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should 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)	B – force;		1
(b)	B – energy;		1
(c)	A - gravitational potential energy;		1
(d)	D – the vertical forces on it are balanced;		1

Total 4 marks

Question number	Answer	Notes	Marks
2 (a)	10 000; N;	allow 9800, 9810, 10^4 allow "newton(s)" marks are independent	2
(b) (i)	density = mass / volume;	allow abbreviation, e.g. ρ = m/V, d = m/V or rearrangements	1
(ii)	substitution OR rearrangement; evaluation; e.g. 2300 = 1000/volume = 0.43 (m^3)	award if either seen in working allow 0.4, 0.434, 0.435, 0.4347... condone 0.44	2
(c) (i)	bar chart / bar graph;	condone histogram	1
(ii)	any 1 from: MP1. idea that (density) data is discontinuous; MP2. materials have non-numerical values / are not quantifiable; MP3. material types identified as categories; MP4. idea that a line graph would indicate continuity;	discrete, categoric, non/not continuous	1
(iii)	cork is less dense OR water is denser; cork 25%, ¼ as dense OR water four times denser;	accept correct calculation of <u>both</u> densities for 2 marks	2

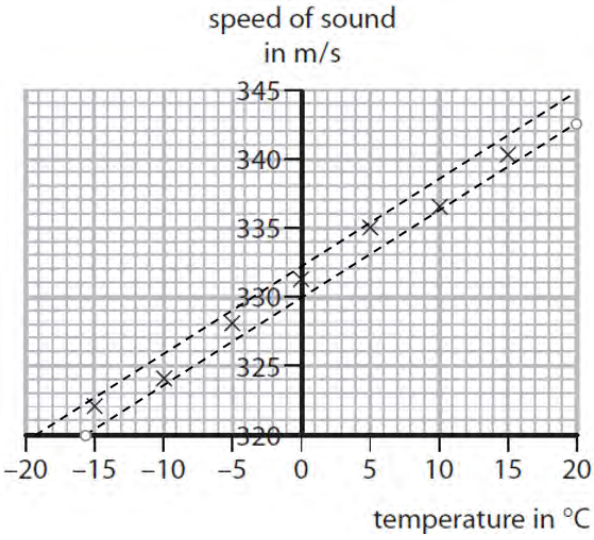
Total 9 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>3 (a)</td><td>any one line correct for one mark;
all three lines correct for two marks;;
 
</td><td>more than one line to a box does not score</td><td>2</td></tr>
<tr><td>(b) (i)</td><td>18;
192;
<table><tr><th></th><th>Temperature in °C</th><th>Temperature in kelvin</th></tr><tr><td>room temperature</td><td>18</td><td>291</td></tr><tr><td>triple point of ethyne</td><td>-81</td><td>192</td></tr></table></td><td></td><td>2</td></tr>
<tr><td>(ii)</td><td>decreases / OWTTE;</td><td>ignore “molecules slow down”</td><td>1</td></tr>
<tr><td>(iii)</td><td>remains constant / no change / nothing;</td><td></td><td>1</td></tr>
</table>

Total 6 marks

Question number	Answer	Notes	Marks
4 (a) (i)	MP1. (due to) friction (between car and ground/air); MP2. idea of <u>electron</u> transfer;	allow idea of materials rubbing allow 'scraped off' for transfer ignore "charge", "static" reject (for MP2 mark) protons moving / positive electrons	2
(ii)	idea of an insulator OR insulating material (between car and ground);	e.g. rubber tyre allow RA e.g. 'tyre is a non-conductor' ignore comments relating to charge being unable to move e.g. 'car not earthed'	1
(b) (i)	(otherwise there would be a risk of) shock / spark / fire / explosion;	ignore "to avoid travel sickness"	1
(ii)	any 2 from: MP1. metal (strap) is a conductor; MP2. (hence) idea of current / charge moving (in the strap/metal/wire); MP3. (electrons flow) between earth/ground/road and car;	 reject references to positive charge/protons allow ideas of "earthing" or "grounding" e.g. "It (charge/car) is earthed by the strap"	2

Total 6 marks

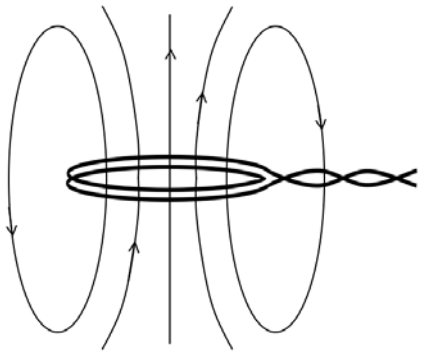
Question number	Answer	Notes	Marks
5 (a)	idea that higher frequency gives higher pitch;	allow reverse argument condone idea of proportionality / linearity	1
(b) (i)	(wave) speed = frequency × wavelength	allow abbreviation, e.g. v = f × λ or rearrangements	1
(ii)	substitution into correctly rearranged equation; evaluation; e.g. (v =) 340 / 160 (v =) 2.1 (m)	 allow 2.125, 2.12, 2.13 or 2 (if supported)	2
(c) (i)	straight line of best fit drawn within indicated area;  	line does not need to be extended beyond data range for this mark	1
(ii)	line of best fit extended to 20°C; student's own value from graph ± half a square;		2

(d)	any 2 from: MP1. speed (of sound) decreases (with temperature); MP2. frequency is constant; MP3. so wavelength decreases (with temperature);	 allow 'sound slows down' ignore references to particle speed allow λ is smaller	2

Total 9 marks

Question number	Answer	Notes	Marks
6 (a)	idea that background activity should be subtracted (from each reading);		1
(b)	time taken; and either for amount of (radioactive) nuclei / atoms / isotope to halve; OR for (radio)activity to halve	allow "how long it takes" allow • decay by half • decay to half ignore particles / molecules, "breakdown", "reactivity" reject if implies a single nucleus/atom	2
(c) (i)	evidence of use of graph; 56 ± 3 (s);	e.g. lines to two correct points on graph or appropriate subtraction shown in working	2
(ii)	any 1 from: MP1. idea of {more accurate / smoother} curve; MP2. idea that activity changes quickly; MP3. idea that decay takes very little time;	allow more points to plot on graph decays quickly (sample has) short half life	1

Total 6 marks

Question number	Answer	Notes	Marks
7 (a)	MP1. at least one straight, vertical central field line; MP2. any field line drawn circling the wire / at least one peripheral field loop; MP3. field directions correct and consistent throughout and shown on at least two lines; 	ignore breaking of field lines as they pass through the centre of the coil by eye condone spiral drawn round wire	3
(b)	any 3 from: MP1. idea of magnetic fields interacting; MP2. idea of (magnetic) attraction or repulsion; MP3. reversing current reverses direction of magnetic field / force; MP4. some comparison with magnets, e.g. like poles repel, unlike poles attract;	allow field lines crossing ignore 'cutting' reject mention of electrostatic force or charge mention of having 'poles'	3

Total 6 marks

Question number	Answer	Notes	Marks
8 (a) (i)	385 (J);		1
(ii)		reverse calculation e.g. calculating a voltage or charge gains 1 mark max.	
	substitution into E=QV; evaluation to at least 2 s.f.;		2
		if no other mark given allow 1 mark for 10^6 or 1000000 seen in working	
	e.g. (E =) 385 × 180 000 (E =) 69 000 000 (J) / 69 (MJ)	allow ecf from 8(a)(i) value	
(iii)	MP1. idea of <u>energy</u> wasted; MP2. appropriate mechanism;	allow not 100% efficient, <u>energy</u> lost e.g. heat in wires	2
8 (b) (i)	charge = current × time;	allow abbreviations e.g. Q = I × t or rearrangements	1
(ii)	substitution; rearrangement; evaluation; e.g. 180 000 = current x (110 x 60) (current =) 180 000 / (110 × 60) (current =) 27 (A)	ignore not converting time to seconds until evaluation allow 27.3, 27.27… 1600, 1640, 1636 etc. gain 2 marks if no other mark given allow 1 mark for 60 seen anywhere in working (attempt to convert to seconds)	3

Total 9 marks

Question number	Answer	Notes	Marks
9	any 5 from: MP1. increased voltage (with step up transformer); MP2. (therefore) reduced current; MP3. current linked to heating; MP4. (therefore) less {energy / power} is lost / wasted (in transmission); MP5. reference to $P=I^2R$ equation; MP6. example of an efficiency enhancing detail of cables; MP7. example of an efficiency enhancing detail of transformer construction; MP8. step down transformer reduces voltage / increases current;	 allow 'steps up voltage' allow $P=IV$ if clear that V is the voltage drop across the cables. e.g. good conductor, low resistance, large diameter e.g. low resistance coils, coils wrapped on top of each other, soft iron core, laminated core allow 'steps down voltage'	5

Total 5 marks

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