

# **Mark Scheme (Results)**

Summer 2017

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

Pearson Edexcel Level 1/Level 2 Certificate  
in Physics (KPH0) Paper 2P

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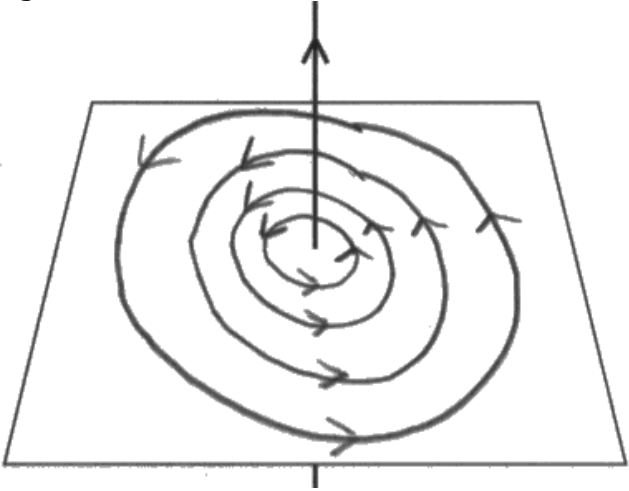
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## **General Marking Guidance**

- 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.

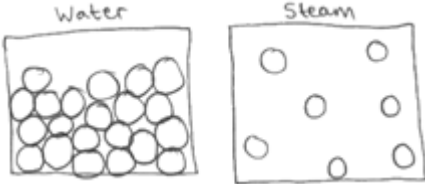
Question number	Answer	Notes	Marks
1 (a)	<p>B – mass;</p> <p><b>The only correct answer is B</b></p> <p>A is not correct because it's a vector</p> <p>C is not correct because it's a vector</p> <p>D is not correct because it's a vector</p>		1
(b)	<p>A – acceleration;</p> <p><b>The only correct answer is A</b></p> <p>B is not correct because it's a scalar</p> <p>C is not correct because it's a scalar</p> <p>D is not correct because it's a scalar</p>		1
(c)	<p>B;</p> <p><b>The only correct answer is B</b></p> <p>A is not correct because the ball would be accelerating as it falls</p> <p>C is not correct because the ball would be accelerating as it falls</p> <p>D is not correct because the ball would be falling at a constant velocity</p>		1

Total for question 1 = 3 marks

Question number	Answer	Notes	Marks
2 (a) (i)	<p>MP1. single circle centred on the wire and parallel to the plane of the card;</p> <p>MP2. at least two concentric circles;</p> <p>MP3. anti-clockwise direction arrow marked on at least one line;</p> <p>e.g.</p> 	<p>allow gap where circle crosses wire</p> <p>circles do not have to stay within the card DOP ignore spacing reject if contradicting arrows</p>	3
(ii)	<p>EITHER:</p> <p>MP1. iron filings used;</p> <p>MP2. tap card / eq.;</p> <p>OR</p> <p>MP1. (plotting) compass used;</p> <p>MP2. multiple compasses used / compass moved to new position;</p> <p>OR</p> <p>MP1. use of a magnet / another current-carrying conductor;</p> <p>MP2. to produce a force / movement;</p>	<p>ignore references to magnets, other current-carrying wires being used allow iron powder, steel dust etc.</p> <p>allow use of a magnetometer</p>	2

(b)	(i)	<table border="1"> <thead> <tr> <th>Statements</th> <th>Order</th> </tr> </thead> <tbody> <tr> <td>the switch is closed</td> <td>1</td> </tr> <tr> <td>the lamp is on</td> <td>(6)</td> </tr> <tr> <td>the armature is attracted</td> <td>3</td> </tr> <tr> <td>the contacts are pushed together</td> <td>5</td> </tr> <tr> <td>the electromagnet is magnetised</td> <td>2</td> </tr> <tr> <td>the armature rotates</td> <td>4</td> </tr> </tbody> </table> <p>all five numbers in correct positions = 3 marks;;;  three-four numbers in correct positions = 2 marks only;;  one-two numbers in correct positions = 1 mark only;</p>	Statements	Order	the switch is closed	1	the lamp is on	(6)	the armature is attracted	3	the contacts are pushed together	5	the electromagnet is magnetised	2	the armature rotates	4		3
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the electromagnet is magnetised	2																	
the armature rotates	4																	
	(ii)	<p>idea that electromagnet loses its magnetism;</p> <p>AND 1 of;</p> <ul style="list-style-type: none"> <li>armature no longer attracted / idea that armature moves away from the magnet</li> <li>opens the contacts / breaks the <b>lamp</b> circuit</li> </ul>	<p>condone idea that electromagnet is not magnetic</p> <p>allow iron for armature</p> <p>ignore references to current not flowing</p>	2														

Total for question 2 = 10 marks

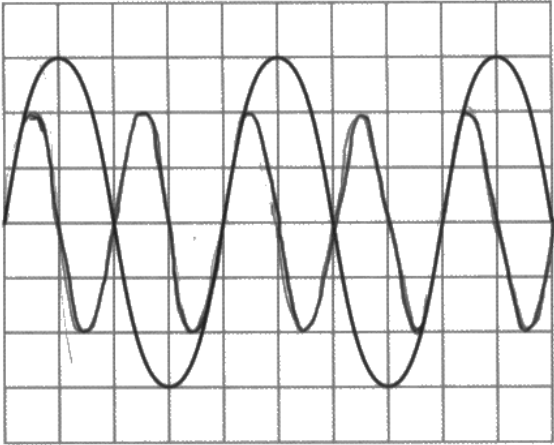
Question number	Answer	Notes	Marks
3 (a)	any 2 of: MP1. particles gain kinetic energy / KE; MP2. particles move further apart; MP3. some particles escape / evaporate from the surface / become a gas/vapour;	allow particles move faster / vibrate more  allow particles break bonds	2
(b)	comment about separation; e.g. particles in steam further apart  comment about location of particles; e.g. steam particles fill container but water particles have a surface e.g.  = 2 marks	ignore comments referring to motion of particles  allow steam takes volume of container but water doesn't  allow marks if seen on a labelled diagram or writing	2
(c)	any 3 of:  MP1. (average) speed / KE of particles decreases (when cooled); MP2. particles collide less often with the can; MP3. (when cooled) pressure inside the can decreases;  MP4. pressure outside greater than pressure inside the can;	allow molecules for particles throughout allow 'particles join water' / steam condenses (into water)  allow particles collide with the can with less force allow pressure proportional to temperature ignore references to vacuum allow RA	3

Total for question 3 = 7 marks

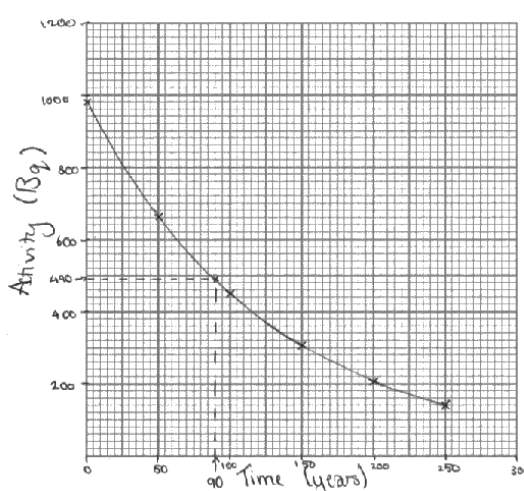
Question number	Answer	Notes	Marks										
4 (a)	<p>one mark for each correct tick;; if three ticks, 1 mark maximum if four ticks, zero marks</p> <table border="1" data-bbox="308 266 1246 602"> <thead> <tr> <th data-bbox="308 266 1145 334">Statement</th> <th data-bbox="1145 266 1246 334">Tick</th> </tr> </thead> <tbody> <tr> <td data-bbox="308 334 1145 402">negatively charged particles move from the cloth onto the balloon</td> <td data-bbox="1145 334 1246 402">✓</td> </tr> <tr> <td data-bbox="308 402 1145 470">positively charged particles are rubbed off the balloon</td> <td data-bbox="1145 402 1246 470"></td> </tr> <tr> <td data-bbox="308 470 1145 538">negatively charged particles on the balloon are protons</td> <td data-bbox="1145 470 1246 538"></td> </tr> <tr> <td data-bbox="308 538 1145 602">the cloth becomes positively charged</td> <td data-bbox="1145 538 1246 602">✓</td> </tr> </tbody> </table>	Statement	Tick	negatively charged particles move from the cloth onto the balloon	✓	positively charged particles are rubbed off the balloon		negatively charged particles on the balloon are protons		the cloth becomes positively charged	✓		2
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negatively charged particles move from the cloth onto the balloon	✓												
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negatively charged particles on the balloon are protons													
the cloth becomes positively charged	✓												
(b) (i)	any 1 of: (possibility of a) spark; (possibility of an) explosion / fire / eq;	ignore references to shock allow 'ignite the petrol'	1										
(b) (ii)	earthing / grounding the {tank / pipe};	allow hose for pipe allow can for tank allow description of earthing e.g. 'connecting tank/pipe to ground (with a wire)'	1										
(c)	(granules) repel;  (because) charge on the granules is all the same / eq;	ignore references to attraction to container	2										

Total for question 4 = 6 marks



Question number	Answer	Notes	Marks
5 (a)	20 (Hz) to 20 000 (Hz);;	one mark for each end of the range correct allow 20 kHz for 20 000 Hz	2
(b) (i)	microphone;		1
(b) (ii)	any 3 of:  MP1. adjust the oscilloscope to get a steady trace / eq; MP2. adjust time base / oscilloscope to give a minimum of 1 complete cycle (on the screen); MP3. measure number of squares for a number of complete cycles / waves; MP4. multiply number of squares by the time base / eq. (to find T); MP5. use $f = 1/T$ ;	ignore references to wavelength, amplitude, finding number of waves passing a point  allow 'measure/find the time period / time for one wave' if neither MP3 or MP4 scored	3
(b) (iii)	amplitude smaller throughout;  <u>double</u> the original frequency throughout;  	ignore vertical position of waveform	2

Total for question 5 = 8 marks

Question number	Answer	Notes	Marks														
6 (a) (i)	suitable linear scale chosen (>50% of grid used); axes labelled with quantities and units; plotting correct to nearest half square;;	orientation needs to be correct  -1 for each mistake to a maximum of -2	4														
(ii)	line (curve) of best fit acceptable;	allow ECF from plotting i.e. smooth curve with points evenly distributed about it	1														
	 <table border="1" data-bbox="319 925 829 1010"> <thead> <tr> <th>Time in years</th> <td>0</td> <td>50</td> <td>100</td> <td>150</td> <td>200</td> <td>250</td> </tr> </thead> <tbody> <tr> <th>Activity in Bq</th> <td>980</td> <td>660</td> <td>450</td> <td>305</td> <td>205</td> <td>140</td> </tr> </tbody> </table>	Time in years	0	50	100	150	200	250	Activity in Bq	980	660	450	305	205	140		
Time in years	0	50	100	150	200	250											
Activity in Bq	980	660	450	305	205	140											
(iii)	appropriate working shown on graph or numerically; 90 years;	allow ECF from graph answer within range of 85-95 (years) gets 2 marks	2														
(b) (i)	$(0.56 \times 2.7 =) 1.5$ (W);	allow 1.51, 1.512	1														
(ii)	idea that alpha has short range / low penetrating power;  and 1 of; <ul style="list-style-type: none"> <li>alpha absorbed by the case</li> <li>alpha does not reach the skin</li> </ul>	ignore 'alpha is weak' ignore 'alpha can't penetrate paper'  allow 'cannot penetrate the case' allow 'cannot penetrate the skin'	2														
(c)	longer half-life means plutonium decays more slowly; idea that it generates electricity / power for longer;	accept RA  allow idea that <b>energy</b> does not 'run out'	2														

Total for question 6 = 12 marks

Question number	Answer	Notes	Marks
7 (a) (i)	momentum = mass x velocity;	in words or accepted symbols e.g. $p = m \times v$	1
(ii)	substitution; evaluation; unit;  e.g. ( $p =$ ) $0.000\ 035 \times 8.8$ ( $p =$ ) $0.00031$ kg m/s	-1 for power of ten (POT) error kg m/s or Ns  $3.08 \times 10^{-4}$ , $0.000308$ Ns allow $0.308$ g m/s for 3 marks	3
(b) (i)	gravitational (potential) energy = mass x g x height;	allow in standard symbols or in words e.g. $GPE = m \times g \times h$ reject 'gravity' for g	1
(ii)	substitution; evaluation;  e.g. ( $GPE =$ ) $0.000\ 035 \times 10 \times 1200$ ( $GPE =$ ) $0.42$ (J)	allow use of $g=9.8 / 9.81$ $420$ (J) gets 1 mark max.  allow $0.4116$ , $0.41202$	2
(iii)	same answer as (b)(ii);	allow $0.42$ (J)	1
(c) (i)	$KE = \frac{1}{2} \times m \times v^2$ ;	allow in accepted symbols or words	1
(ii)	substitution; rearrangement; evaluation;  e.g. $0.42 = \frac{0.000\ 035 \times v^2}{2}$ $v^2 = 24000$ ( $v =$ ) $155$ (m/s)	ECF from (b)(iii)  answer must be seen to at least 3 s.f. award 2 marks max. for reverse calculation of $KE = 0.394$ (J)  $154.919\dots$	3
(iii)	any 2 of: MP1. (raindrop reaches) terminal velocity; MP2. drag / air resistance / friction acts; MP3. energy lost to surroundings / eq.; MP4. (resultant) downwards force is less;	ignore unqualified "it loses energy"  allow 'acceleration is less'	2

Total for question 7 = 14 marks

