



Mark Scheme (Results)

January 2019

Pearson Edexcel International GCSE

In Physics (4PH0) 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																					
2 (a)	a quantity with magnitude / size; (and) direction;	allow 'amount' for magnitude	2																					
(b)	<table border="1" data-bbox="354 427 948 1070"> <thead> <tr> <th data-bbox="354 427 553 483">Quantity</th> <th data-bbox="553 427 750 483">Scalar</th> <th data-bbox="750 427 948 483">Vector</th> </tr> </thead> <tbody> <tr> <td data-bbox="354 483 553 582">energy</td> <td data-bbox="553 483 750 582">✓</td> <td data-bbox="750 483 948 582"></td> </tr> <tr> <td data-bbox="354 582 553 680">speed</td> <td data-bbox="553 582 750 680">✓</td> <td data-bbox="750 582 948 680"></td> </tr> <tr> <td data-bbox="354 680 553 779">weight</td> <td data-bbox="553 680 750 779"></td> <td data-bbox="750 680 948 779">✓</td> </tr> <tr> <td data-bbox="354 779 553 878">acceleration</td> <td data-bbox="553 779 750 878"></td> <td data-bbox="750 779 948 878">✓</td> </tr> <tr> <td data-bbox="354 878 553 976">charge</td> <td data-bbox="553 878 750 976">✓</td> <td data-bbox="750 878 948 976"></td> </tr> <tr> <td data-bbox="354 976 553 1070">moment</td> <td data-bbox="553 976 750 1070"></td> <td data-bbox="750 976 948 1070">✓</td> </tr> </tbody> </table> <p data-bbox="354 1126 815 1232">one or two correct ticks = 1 mark ; three or four correct ticks = 2 marks;; all five correct ticks = 3 marks;;;</p>	Quantity	Scalar	Vector	energy	✓		speed	✓		weight		✓	acceleration		✓	charge	✓		moment		✓	reject any row with two ticks	3
Quantity	Scalar	Vector																						
energy	✓																							
speed	✓																							
weight		✓																						
acceleration		✓																						
charge	✓																							
moment		✓																						

Total for question 2 = 5 marks

Question number	Answer	Notes	Marks
3 (a)	B; C;	reject if more than one letter given reject if more than one letter given	2
(b)	substitution; rearrangement; evaluation; e.g. $380\,000 = m \times 10 \times 45$ $(m =) 380\,000 / (10 \times 45)$ $(m =) 840 \text{ (kg)}$	-1 for POT error allow 844, 844.4...(kg) 862 (kg) if $g=9.8$ 861 (kg) if $g=9.81$	3

Total for question 3 = 5 marks

Question number	Answer	Notes	Marks
4 (a)	(i) 0.717; N;	allow 0.7, 0.72, 0.70, 0.703... allow newton(s) condone n marks are independent	2
	(ii) density = mass / volume;	allow symbols, e.g. $\rho = m/V$, $d = m/V$ or rearrangements	1
	(iii) substitution OR rearrangement; evaluation; e.g. $8960 = 0.0717 / V$ OR $V = m / \rho$ ($V =$) $8.00 \times 10^{-6} \text{ (m}^3\text{)}$	-1 for POT error allow 8×10^{-6} , $8.002... \times 10^{-6}$ answer does not need to be in standard form e.g. $0.000008 \text{ (m}^3\text{)}$ gets both marks	2
(b)	(i) bar chart / bar graph;	accept column graph condone histogram	1
	(ii) steel is more dense; OR granite is less dense; steel is (approximately) $3\times$ denser;	allow ratio of densities in range 2.8-3.1 ignore comparison of masses accept correct values of both densities for 2 marks e.g. steel = 7900 kg/m^3 granite = 2700 kg/m^3 tolerance ± 100 on each	2

Total for question 4 = 8 marks

Question number	Answer	Notes	Marks
5 (a)	<p>MP1. measure time for a set distance;</p> <p>MP2. realistic values suggested for experiment to work;</p> <p>MP3. suitable measuring instrument named;</p> <p>MP4. further detail of setup;</p> <p>MP5. idea of repeats and average;</p> <p>MP6. reference to $\text{speed} = \text{distance} / \text{time}$;</p>	<p>allow measuring wavelength for a known frequency e.g.</p> <ul style="list-style-type: none"> • greater than 1m for microphones and oscilloscope method • greater than 100m for seeing and hearing a clap method • greater than 50m for wall and echo method • wavelength measured greater than 10cm <p>e.g. stop clock, stopwatch, ruler, tape measure, oscilloscope</p> <p>e.g.</p> <ul style="list-style-type: none"> • two microphones on bench connected to oscilloscope • start timing when see a clap and stop when hear it • clap by wall and time how long for clap to come back • moving a microphone until waveforms line up on oscilloscope <p>allow $\text{speed} = \text{frequency} \times \text{wavelength}$</p>	6

(b)	<p>(i) straight line of best fit drawn within indicated area;</p> <div data-bbox="395 719 849 1128" data-label="Figure"> <p>speed of sound in m/s</p> <table border="1"> <caption>Data points from the graph</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Speed of sound (m/s)</th> </tr> </thead> <tbody> <tr><td>-15</td><td>322</td></tr> <tr><td>-10</td><td>326</td></tr> <tr><td>-5</td><td>329</td></tr> <tr><td>0</td><td>332</td></tr> <tr><td>5</td><td>335</td></tr> <tr><td>10</td><td>338</td></tr> <tr><td>15</td><td>341</td></tr> <tr><td>20</td><td>344</td></tr> </tbody> </table> <p>temperature in °C</p> </div> <p>(ii) line of best fit extended as a straight line to 20°C; student's own value from graph \pm half a square;</p> <p>(iii) speed (of sound) decreases (with temperature); so wavelength decreases (with temperature);</p>	Temperature (°C)	Speed of sound (m/s)	-15	322	-10	326	-5	329	0	332	5	335	10	338	15	341	20	344	<p>line does not need to be extended beyond data range for this mark</p> <p>condone straight line extension of dot to dot line allow range of 342-345 (m/s) allow ecf from line drawn in (i)</p> <p>allow 'sound slows down' ignore references to particle speed allow λ is smaller</p>	<p>1</p> <p>2</p> <p>2</p>
Temperature (°C)	Speed of sound (m/s)																				
-15	322																				
-10	326																				
-5	329																				
0	332																				
5	335																				
10	338																				
15	341																				
20	344																				

Total for question 5 = 11 marks

Question number	Answer	Notes	Marks	
6	<p>any two advantages:</p> <p>MP1. idea that fuel will last for a long time;</p> <p>MP2. high energy density of fuel;</p> <p>MP3. no CO₂ emissions / no greenhouse gases / does not contribute to global warming / does not produce acid rain;</p> <p>MP4. reliable electricity output / does not depend on weather;</p> <p>any two disadvantages:</p> <p>MP5. waste products are radioactive / difficult to dispose of;</p> <p>MP6. chance of nuclear accident;</p> <p>MP7. high security risk;</p> <p>MP8. high construction / decommissioning cost;</p>	<p>ignore idea that fuel is limitless / will not run out</p> <p>allow idea that a small amount of fuel yields a lot of energy</p> <p>allow idea that it can supply electricity / energy constantly ignore unqualified 'it is reliable'</p> <p>e.g. nuclear meltdown, risk from tsunamis etc.</p> <p>ignore unqualified 'it is expensive'</p>	4	exp

Total for question 6 = 4 marks

Question number	Answer	Notes	Marks
7 (a)	fewer turns on the secondary;	allow RA	1
(b) (i)	word equation or $V_p I_p = V_s I_s$;	$V_p/V_s = I_s/I_p$ or $V_s/V_p = I_p/I_s$ or $I_1 V_1 = I_2 V_2$	1
(ii)	correct equation substituted OR rearranged; evaluation; e.g. $230 \times I_p = 5.5 \times 1.0$ OR $I_p = V_s I_s / V_p$ ($I_p =$) 0.024 (A)	 allow 0.0239...(A) allow 0.02 (A) if supported by working	2
(c)	any two from: MP1. input power increases; MP2. (input) voltage remains the same; MP3. (input) current increases;	allow energy for power	2

Total for question 7 = 6 marks

Question number	Answer	Notes	Marks
9 (a)	(i) momentum = mass \times velocity;	allow rearrangements and standard symbols e.g. $p = m \times v$ reject m for momentum	1
	(ii) substitution and evaluation; e.g. ($p =$) 0.039×0.56 ($p =$) 0.022 (kgm/s)	0.02184 (kgm/s) allow 0.02 (kgm/s) if supported by working	1
	(iii) use of conservation of momentum; evaluation of total mass; evaluation of mass of truck; e.g. $0.022 = m \times 0.26$ total mass = 0.084 mass of truck = $(0.084 - 0.039 =) 0.045$ (kg)	allow 'momentum before = momentum after' seen anywhere can also be implied from calculation allow ecf from (ii) allow $0.0846\dots$ (kg) allow $0.0456\dots$ (kg)	3
(b)	total mass (of system) is now greater; total momentum is the same as before; velocity will be lower than before;	allow "momentum is conserved" calculation of new velocity = $0.169\dots$ m/s scores all 3 marks	3

Total for question 9 = 8 marks

