

Mark Scheme (Results)

Summer 2015

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

Pearson Edexcel Level 1/Level 2 Certificate  
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)           | <p>cooking – micro(waves) OR infrared (waves);</p> <p>treating cancer – ultraviolet OR x-rays OR gamma (rays);</p> <p>identifying broken bones - x-rays;</p>  | if more than one example given for each use then reject mark if any incorrect   | 3     |
| (b)             | C - the same speed;   |   | 1     |
| (c) (i)         | <p>drawn ray shows refraction in the correct direction (downwards) at <b>both</b> surfaces;</p> <p>drawn ray is above yellow ray and diverges from it (if ray had entered at the original point);</p> | <p>judge by eye<br/>ignore arrows and labels<br/>dependent on previous</p> <p>allow if ray drawn enters <b>parallel</b> to original ray</p> | 2     |
| (ii)            | A- black;   |   | 1     |

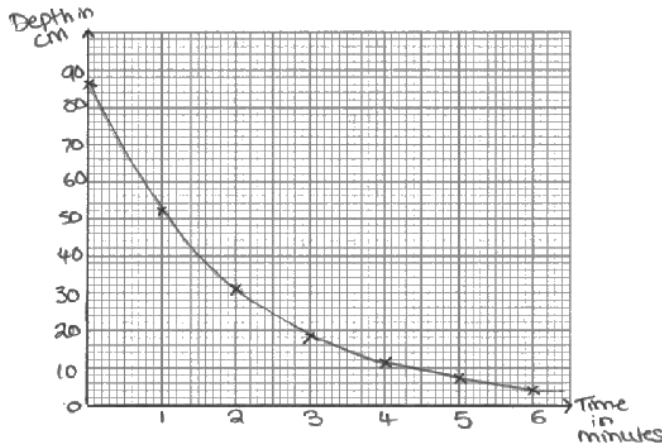
Total 7 marks

| Question number | Answer   | Notes  | Marks |
|-----------------|--|--|-------|
| 2 (a) (i)       | B - 960 joules per second;   |  | 1     |
| (ii)            | power = current x voltage;   | allow equation as correct symbols and/or rearrangement<br>e.g. $I = P \div V$  | 1     |
| (iii)           | appropriate calculation (including substitution OR rearrangement);<br>answer to at least 2 sf seen anywhere;<br><br>e.g.<br>$960 = I \times 230$<br>(I =) 4.2 (A)  | using 4 (A) to calculate power (920 W) or voltage (240 V) scores 1 mark max.<br><br>(4.17391)<br>allow 4.1 (A)                               | 2     |
| (b) (i)         | any 3 of:<br><br>MP1. large <b>current</b> to earth / in earth wire;<br><br>MP2. fuse blows / melts / breaks;<br>MP3. idea that circuit is broken;<br>MP4. idea that the risk of shock is reduced / prevented;               | ignore references to electricity or charge<br>allow 'current surge' for large current<br>'ground' for earth<br><br>ignore references to fire | 3     |
| (ii)            | D - 13 A;  |  | 1     |
| (c)             | MP1. a way of measuring current e.g. ammeter;<br>MP2. a <b>method</b> to vary current in fuse;<br><br>MP3. a <b>method</b> of identifying that the fuse has broken e.g. lamp goes out, idea that current falls to zero etc.; | accept any points seen in diagram<br>allow data logger<br><br>allow <b>variable</b> power supply, <b>variable</b> resistor                   | 3     |

Total 11 marks

| Question number | Answer  | Notes   | Marks |
|-----------------|---|---|-------|
| 3 (a)           | A - Force X 7.5 N, Force Y 7.5 N ;                          |   | 1     |
| (b)             | idea that force X decreases;<br><br>from 15 (N) / to 0 (N); | ignore references to force Y and moments<br><br>'it goes from 15 to 0' gets 2 marks | 2     |

Total 3 marks

| Question number | Answer   | Notes  | Marks           |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
|-----------------|--|--|-----------------|-------------------|---|----|---|----|---|----|---|----|---|----|---|---|---|---|---|
| 4 (a)           | <p><u>metre</u> rule(r);</p> <p>stop watch / stop clock;</p>   | <p>allow (metal) tape measure / measuring tape / <u>metre</u> stick</p> <p>ignore timer</p> <p>either order</p>  | 2               |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| (b) (i)         | <p>suitable scale chosen (&gt;50% of grid used);</p> <p>axes labelled with quantities and unit;</p> <p>plotting correct to nearest half square (minus one for each plotting error);;</p> <p>line (curve) of best fit acceptable;</p> <div></div> | <p>reject 'm' for minutes</p> <p>orientation unimportant</p> <p>i.e. two plotting errors = no marks for plotting</p> <p>i.e. smooth curve within 1 small square of each point</p> <table><tr><th>time in minutes</th><th>water depth in cm</th></tr><tr><td>0</td><td>86</td></tr><tr><td>1</td><td>52</td></tr><tr><td>2</td><td>31</td></tr><tr><td>3</td><td>18</td></tr><tr><td>4</td><td>11</td></tr><tr><td>5</td><td>7</td></tr><tr><td>6</td><td>4</td></tr></table> | time in minutes | water depth in cm | 0 | 86 | 1 | 52 | 2 | 31 | 3 | 18 | 4 | 11 | 5 | 7 | 6 | 4 | 5 |
| time in minutes | water depth in cm  |  |                 |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| 0               | 86   |  |                 |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| 1               | 52   |  |                 |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| 2               | 31   |  |                 |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| 3               | 18   |  |                 |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| 4               | 11   |  |                 |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| 5               | 7  |  |                 |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| 6               | 4  |  |                 |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |
| (ii)            | <p>idea that <b>depth</b> decreases with time;</p> <p>idea that relationship is non linear;</p>  | <p>allow RA</p> <p>ignore 'negative correlation'</p> <p>Ignore all references to 'proportional' and 'curved'</p> <p>allow idea of rate arguments</p> <p>e.g. 'depth decreases more slowly with time' gets 2 marks</p> <p>allow exponential decrease for 2 marks</p>  | 2               |                   |   |    |   |    |   |    |   |    |   |    |   |   |   |   |   |

|     |   |   |   |
|-----|---|---|---|
| (c) | any 1 of:<br>MP1. idea of pressure decreasing (with depth / time);<br>MP2. idea of force changing with {pressure / depth / time};<br>MP3. idea of (available) GPE decreasing; | allow RA<br><br>allow 'weight' for force<br>ignore 'mass' | 1 |
|-----|---|---|---|

Total 10 marks



| Question number | Answer  | Notes  | Marks |
|-----------------|---|--|-------|
| 5 (a) (i)       | momentum = mass $\times$ velocity;  | allow symbols and rearrangements<br>e.g. $p = m \times v$  | 1     |
| (ii)            | substitution into correct equation;<br>evaluation;<br><br>e.g.<br>(momentum =) $0.23 \times 13$<br>= 3.0 (kg m/s)   | allow 3, 2.99  | 2     |
| (b)             | <p>explanation in terms of conservation of momentum OR Newton's third law</p> <p><b>conservation of momentum</b> - any 3 of:</p> <p>MP1. mention of conservation of momentum;</p> <p>MP2. momentum of snowball <b>and</b> skater;</p> <p>MP3. (are) equal and opposite;</p> <p>MP4. because momentum initially zero;</p> <p>OR</p> <p><b>Newton's third law</b> - any 3 of:</p> <p>MP1. mention of {action and reaction / Newton III law};</p> <p>MP2. forces on skater <b>and</b> snowball;</p> <p>MP3. (are) equal and opposite;</p> <p>MP4. idea that (magnitude of) rate of change of momentum is same for both forces;</p> | <p>allow 'her' or similar to mean the skater<br/>allow e.g.<br/>-3.0 (kg m/s)</p> <p>allow 'her' or similar to mean the skater<br/>condone 'push' for force</p> <p><b>if no other mark awarded</b>, allow 'because there is no / little friction' for 1 mark</p> | 3     |



| Question number | Answer   | Notes   | Marks |
|-----------------|--|---|-------|
| 6 (a)           | <p>any 3 of:</p> <p>MP1. idea of {rubbing / tearing} of {materials / surfaces};</p> <p>MP2. idea of movement / transfer of electrons;</p> <p>MP3. electrons have negative charge;</p> <p>MP4. (object becomes) negatively charged by gaining electrons OR positively charged by losing electrons;</p> <p>MP5. need for insulating material(s);</p> | <p>movement of positive {charge / electrons} can only score MP1 and MP5<br/>ignore 'friction'</p> | 3     |
| (b)             | <p>any 2 of:</p> <p>MP1. idea of <b>opposite</b> charges OR positive and negative charges;</p> <p>MP2. idea of attraction;</p> <p>MP3. idea of an (attractive) force larger than the weight of the loose end of tape;</p>  | <p>reject if mentions positive electrons<br/>ignore 'different'<br/>condone 'unlike'</p>          | 2     |

Total 5 marks

| Question number | Answer   | Notes  | Marks |
|-----------------|--|--|-------|
| 7 (a)           | <p>top line correct e.g. 228;<br/>bottom line correct e.g. 88 and 2;<br/>e.g.</p> $\begin{array}{ccc} \boxed{232} & & \boxed{228} \\ \boxed{90} & \text{Th} \rightarrow & \boxed{88} \end{array} \begin{array}{c} \text{Ra} \\ + \end{array} \begin{array}{ccc} \boxed{4} & & \\ \boxed{2} & & \alpha \end{array}$ |  | 2     |
| (b) (i)         | idea that {alpha/beta} is {absorbed by / unable to penetrate} {aluminium / glass};   | allow stops / blocks for absorbs<br><br>ignore references to paper, air, lead<br>ignore references to gamma, unqualified 'radiation' | 1     |
| (ii)            | <p>any 2 of:</p> <p>MP1. idea of radiation being ionising;</p> <p>MP2. (radiation) causes cancer / cell mutation / kills cells / blindness;</p> <p>MP3. {alpha / beta} will travel this short distance (between lens and eye);</p> <p>MP4. idea that astronomer is likely to suffer prolonged exposure;</p>        | <p>ignore references to gamma</p> <p>allow (eye) within penetrating range of {alpha / beta}</p>                                      | 2     |

Total 5 marks

| Question number | Answer  | Notes  | Marks |
|-----------------|---|--|-------|
| 8 (a) (i)       | step-down (transformer);  |  | 1     |
| (ii)            | <p>MP1. soft material <b>loses</b> magnetism <b>quickly</b> / <b>easily</b>;</p> <p>MP2. idea that magnetic field (in core) alternates / changes;</p> | ignore unqualified references to losing magnetism  | 2     |
| (b) (i)         | $\frac{\text{input / primary voltage}}{\text{output / secondary voltage}} = \frac{\text{primary turns}}{\text{secondary turns}}$                      | <p>allow</p> <ul style="list-style-type: none"> <li>• equation in words with turns ratio shown as a fraction</li> <li>• standard abbreviations :- s, p, in, out, 1, 2</li> <li>• N or n for number of turns (condone T for number of turns)</li> <li>• "number of coils" for number of turns</li> </ul> <p>rearrangements also to include turns ratio as a fraction</p> $(V_s/V_p) = (N_s/N_p)$ <p>[equation inverted]</p> $V_s = (V_p) (N_s/N_p) \text{ [} V_s \text{ as subject]}$ $V_p = (V_s) (N_p/N_s) \text{ [} V_p \text{ as subject]}$ | 1     |
| (ii)            | <p>substitution into a correct equation; evaluation (including rearrangement);</p> <p>e.g.</p> $44 / V = 520 / 30$ $(V =) 2.5 (V)$                    | <p>allow</p> <p>3, 2.53, 2.54, 2.538</p>   | 2     |

|     |      |   |  |   |
|-----|------|---|--|---|
| (c) | (i)  | idea of a (frequency) limit / range to (human) hearing OR (frequency) is {too high / ultrasound};<br>mention of upper limit as 20 000 Hz;             | ignore references to lower limit<br><br>allow 20 kHz<br>ignore references to lower limit   | 2 |
|     | (ii) | conversion of unit;<br><br>substitution and evaluation;<br><br>e.g.<br>$t = 1.5 \text{ ms} = 0.0015 \text{ s}$<br>$(f =) 1/0.0015 = 670 \text{ (Hz)}$ | allow 1000 or 0.001 in working, if no other mark can be given<br><br><br>allow correct rounding only e.g. 700, 667, 666.7, 666.6 (recurring)<br><br>1 mark max for POT error e.g. 0.67, 6.7, 67 etc. | 2 |

Total 10 marks



