

# Mark Scheme (Results)

Summer 2013

International GCSE  
Physics (4PH0) Paper 2P

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

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| Question number |      | Answer   | Notes  | Marks |
|-----------------|------|--|--|-------|
| 1 (a) (i)       |      | C (decreases by 2)   |  | 1     |
|                 | (ii) | D (decreases by 4)   |  | 1     |
|                 | (b)  | D (has less penetrating power)   |  | 1     |
|                 | (c)  | <p>Any four of:</p> <p>MP1 Use of ratemeter / scaler / counter;</p> <p>MP2 Idea of measuring <u>background</u> radiation e.g. background count / correction / subtraction;</p> <p>MP3 A safety precaution (based on distance or absorption) e.g. use of tongs / shielding;</p> <p>MP4 A controlled variable (time / distance / positioning) e.g. "source near/by/to detector", "for a minute";</p> <p>MP5 A practical consideration e.g. repeat / average / reset (scaler);</p> <p>MP6 Mention of becquerel / Bq</p> | <p>Allow description e.g. "count the clicks"</p> <p>Allow Geiger counter</p> <p>Ignore GM detector or tube</p> <p>Ignore descriptions of GM tube</p> <p>Allow "stand back", "wear gloves / protective clothing" "do not point source at people"</p> <p>Ignore "counts per minute"</p> <p>Ignore: mention of anomalies</p> <p>Accept phonetic spellings</p> | 4     |

Total for question 1 = 7 marks

| Question number |  | Answer   | Notes   | Marks |
|-----------------|--|--|---|-------|
| 2 (a) (i)       |  | <p>Power (rating) or watt(s);</p> <p>Rate of energy transfer / joule per second / J/s ;</p>  | <p>Ignore equation from p2:<br/> <u>energy (transferred)</u><br/> time (taken)</p>  | 2     |
| (ii)            |  | <p>Any two of</p> <p>MP1 Idea of a fault causing a hazard;</p> <p>MP2 Idea that current goes to Earth / not to user;</p> <p>MP3 Idea of fuse action, e.g. blows / melts / breaks circuit;</p> <p>MP4 idea of a low resistance path;</p>  | <p>Ignore: current surge, fire</p> <p>Allow:</p> <ul style="list-style-type: none"> <li>• prevents electrocution / shock</li> <li>• flow of charge as current</li> <li>• current to ground</li> </ul> <p>Ignore: electricity / energy goes to earth</p> <p>Allow case at earth potential</p>  | 2     |
| (b) (i)         |  | <p>Agree / disagree - no mark</p> <p>Any three of</p> <p>MP1 Statement of an appropriate equation e.g. power = current x voltage;</p> <p>MP2 At least one appropriate current value calculated, e.g. 2.92 (A) or 0.13 (A);</p> <p>MP3 Idea that fuse rating must be more than working current;</p> <p>MP4<br/> EITHER<br/> Idea that 2.92 A is close to 3A, making 3A fuse a poor choice for soldering iron 'B';<br/> OR<br/> Idea that 3A is much larger than 0.13 A, making 3A fuse a poor choice for soldering iron 'A'</p> | <p>Allow abbreviation and rearrangements e.g. <math>P=IV</math>, <math>I=P/V</math></p> <p>Ignore s.f.<br/> <math>30 \div 230 = 0.13</math> (A)<br/> <math>70 \div 24 = 2.9</math> (A)</p> <p>Allow<br/> <math>70 \div 230 = 0.30</math> (A)</p> <p>Allow reverse arguments, e.g. "lower value fuse would melt"</p> <p>Allow ecf from incorrect calculation</p> | 3     |

|      |  |  |   |   |
|------|--|--|---|---|
| (ii) |  | <p>Any three of</p> <p>MP1 primary AND secondary (coils);</p> <p>MP2 (soft) iron core;</p> <p>MP3 primary/input (coil) has more turns;</p> <p>MP4 further structural detail e.g. insulated wire, core laminations;</p> | <p>May be shown on a labelled diagram<br/>Ignore equations</p> <p>Allow input and output (coils)<br/>Ignore:<br/>magnet</p> <p>Allow:</p> <ul style="list-style-type: none"> <li>• reverse argument</li> <li>• clear indication of relative turns on diagram (judge by eye)</li> <li>• appropriate numbers</li> </ul> | 3 |
|------|--|--|---|---|

Total for question 2 = 10 marks

| Question number |      | Answer  | Notes   | Marks |
|-----------------|------|---|---|-------|
| 3 (a) (i)       |      | 90 (K)  |   | 1     |
|                 | (ii) | Any three of<br>MP1 Idea that particles/molecules move apart;<br><br>MP2 Idea that particles/molecules gain (kinetic) energy;<br><br>MP3 Idea that particles/molecules move more freely;<br><br>MP4 Idea that particles/molecules leave the liquid; | Ignore:<br>molecules vibrate<br>Allow: molecules spread out,<br>take up more space<br>May be shown on labelled diagram<br>Allow:<br>idea of moving faster<br>Ignore :<br>'move more'<br>Allow bonds break<br>Ignore unqualified 'move more'<br>Allow escape<br>Ignore evaporate | 3     |
| (b) (i)         |      | Any two of<br>MP1 radiation / infrared;<br>MP2 Idea of reflection;<br>MP3 Idea of little/no absorption;<br>MP4 Idea of poor emission;   | Allow IR<br><br>Allow bad radiator  | 2     |
|                 | (ii) | Any two of<br>(in a vacuum there are) no atoms/molecules/particles;<br><br>so no/poor conduction;<br><br>so no/little convection (currents);  | Allow:<br>no 'medium'<br>no 'material'<br>There are no molecules to conduct = 2 marks<br>There are no molecules to convect = 2 marks  | 2     |

|     |  |  |  |   |
|-----|--|--|--|---|
| (c) |  | <p>Any two of</p> <p>MP1 Idea that there is cold gas/air/oxygen just above the liquid (surface);</p> <p>MP2 Idea that the gas/air/oxygen in the room is warmer;</p> <p>MP3 Idea that convection currents in air (above liquid surface) unlikely;</p> <p>MP4 Idea that (evaporated) oxygen /air / gas would insulate the surface;</p> <p>MP5 Idea that oxygen/gas would build up pressure in a sealed vessel;</p> | <p>Ignore “heat rises”</p> <p>Allow:<br/>warm air won’t fall,<br/>cool air won’t rise<br/>Ignore density arguments<br/>Allow:<br/>gas is a poor conductor<br/>Allow:<br/>flask would burst if it had a lid</p> | 2 |
|-----|--|--|--|---|

Total for question 3 = 10 marks

| Question  | Answer  | Notes   | Marks |
|-----------|---|---|-------|
| 4 (a) (i) | Momentum = mass x velocity  | Allow abbreviations and rearrangements<br>e.g. $p=mv$ ,<br>mass = $\frac{\text{momentum}}{\text{velocity}}$   | 1     |
| (ii)      | Substitution into correct equation;<br>Calculation;<br>e.g. $17\,000 \times 13$<br>$220\,000$ (kg m/s)  | Allow 221 000   | 2     |
| (b) (i)   | Answers should be in the context of momentum<br><br>(when the lorry stops) the load still has momentum;<br><br>Idea that lorry stops in a shorter time;<br>OR<br>Idea that load takes more time to stop;              | Allow:<br>$(mv-\mu) = Ft$<br><br>Allow for TWO marks<br>lorry loses momentum more quickly;;<br>OR<br>load loses momentum more slowly;;  | 2     |
| (ii)      | MP1<br>Centre of gravity is closer to the front of the lorry;<br><br>MP2<br>Clockwise and anticlockwise moments equal;<br><br>MP3<br>Increase in force related to decrease in distance (to provide balancing moment); | Ignore action and reaction arguments<br>Allow:<br>centre of mass nearer front of lorry<br>there is more weight near the front of the lorry / near B<br>C of G further from rear (wheel)<br>Allow:<br><ul style="list-style-type: none"> <li>Moments are balanced</li> <li>total moment = 0</li> </ul> | 3     |
| (c) (i)1  | Pressure = $\frac{\text{force}}{\text{area}}$ ;   | Allow abbreviations and rearrangements,<br>e.g. $P=F/A$ , force = pressure x area   | 1     |
| (ii)2     | Substitution into correctly rearranged formula;<br>Calculation;<br>e.g. $53\,000 \div 390\,000$<br>$0.14$ (m <sup>2</sup> )   | 0.136 0.135897<br>Allow 1400 cm <sup>2</sup>  | 2     |

Total for question 4 = 11 marks



| Question number                 |                      | Answer | Notes  | Marks   |                      |     |     |      |     |        |     |        |     |       |     |
|---------------------------------|----------------------|--------|--|---|----------------------|-----|-----|------|-----|--------|-----|--------|-----|-------|-----|
| 5                               | (a)                  | (i)    | C (the same speed in free space)   | 1   |                      |     |     |      |     |        |     |        |     |       |     |
|                                 |                      | (ii)   | B (there must be a current in the circuit)   | 1   |                      |     |     |      |     |        |     |        |     |       |     |
|                                 | (b)                  | (i)    | Voltmeter connected in parallel with any circuit component;<br>Component chosen is the LED;  | Ignore a line through the voltmeter symbol  | 2                    |     |     |      |     |        |     |        |     |       |     |
|                                 |                      | (ii)   | <p>Axes labelled- quantity and unit ;</p> <p>Linear scale such that longest bar occupies at least half the grid;</p> <p>Plotting---ignore order of bars<br/>5 bars correctly plotted;;<br/>If only 3 bars correctly plotted allow 1 mark for plotting</p> <table border="1" data-bbox="466 920 1062 1158"> <thead> <tr> <th>Colour of light from LED</th> <th>Minimum voltage in V</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td>1.7</td> </tr> <tr> <td>Blue</td> <td>3.6</td> </tr> <tr> <td>Yellow</td> <td>2.1</td> </tr> <tr> <td>Orange</td> <td>2.0</td> </tr> <tr> <td>Green</td> <td>3.0</td> </tr> </tbody> </table> | Colour of light from LED  | Minimum voltage in V | Red | 1.7 | Blue | 3.6 | Yellow | 2.1 | Orange | 2.0 | Green | 3.0 |
| Colour of light from LED        | Minimum voltage in V |        |  |   |                      |     |     |      |     |        |     |        |     |       |     |
| Red                             | 1.7                  |        |  |   |                      |     |     |      |     |        |     |        |     |       |     |
| Blue                            | 3.6                  |        |  |   |                      |     |     |      |     |        |     |        |     |       |     |
| Yellow                          | 2.1                  |        |  |   |                      |     |     |      |     |        |     |        |     |       |     |
| Orange                          | 2.0                  |        |  |   |                      |     |     |      |     |        |     |        |     |       |     |
| Green                           | 3.0                  |        |  |   |                      |     |     |      |     |        |     |        |     |       |     |
|                                 |                      | (iii)  | <p>Student is right/wrong - no mark</p> <p>Any two of<br/>MP1 idea that the visible spectrum is a sequence, with the end colours identified;<br/>MP2 Colour correctly related to wavelength (e.g. red has longest wavelength);<br/>MP3 Colour correctly related to voltage (e.g. blue needs highest voltage);</p>  | <p>Red to blue (start either end)<br/>Allow ROYGBIV etc</p> <p>Wavelength (or frequency) correctly related to voltage = 2 marks, e.g.<br/>f increases with V<br/>λ increases with 1/V</p> | 2                    |     |     |      |     |        |     |        |     |       |     |
| Total for question 5 = 10 marks |                      |        |  |   |                      |     |     |      |     |        |     |        |     |       |     |

| Question number | Answer  | Notes  | Marks |
|-----------------|---|--|-------|
| 6 (a)           | C (kinetic energy to electrical energy)   |  | 1     |
| (b) (i)         | <p>Conversion to seconds;<br/>           Substitution into correctly rearranged equation;<br/>           Calculation;<br/>           e.g. (time = ) 60 (s)<br/> <math display="block">\frac{39\,000\,000}{(490 \times 60)}</math><br/>           1300 (V)</p>   | <p>No mark for stating the formula, since <math>E = I \times V \times t</math> is given on page 2</p> <p>60 seen in working</p> <p>1330, 1327, 1326.5 (V)<br/>           Correct answer without working scores full marks<br/>           Allow 1.3 kV for THREE marks<br/>           Allow Power of Ten error , for a maximum of TWO marks e.g. <math>1.326 \times 10^{-3}</math>, 1.33, 130</p> | 3     |
| (ii)            | <p>Any four of<br/>           MP1 (High voltage leads to) low current;<br/>           MP2 mention of a relevant equation e.g. <math>P=IV</math>, <math>P=I^2R</math>;<br/>           MP3 Less energy is lost (from the wires);<br/>           MP4 More efficient;<br/>           MP5 can use thinner wires;</p> | <p>Allow less heat loss</p> <p>Ignore cost argument</p> <p>Allow:<br/>           Can transmit the energy further</p>   | 4     |
| (c) (i)         | <p>Current that changes direction (continuously);<br/>           100 times per second;</p>  | <p>Allow switches from +ve to -ve.<br/>           Allow 50 times/cycles per second.<br/>           Allow time period e.g. 0.01 s, 0.02 s, 1/50s<br/>           Allow step-up, step-down</p>  | 2     |
| (ii)            | <p>Transformers change the voltage / current;<br/>           Transformers use alternating current / a.c.;</p>   | <p>Allow reverse argument</p>  | 2     |

Total for question 6 = 12 marks

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