



## Mark Scheme (Results)

Summer 2020

Pearson Edexcel International GCSE  
In Physics (4PH1) Paper 2P

| Question number | Answer                                                                                                                                                                                                  | Notes                                                                                 | Marks |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------|
| 1               | (a) (i) particles with larger spaces between them;<br><br>particles in less regular structure;                                                                                                          | max space in body or surface one of particles from diagram on left.                   | 2     |
|                 | (ii) particles {slide/move/flow} past each other;                                                                                                                                                       | ignore 'more freely'                                                                  | 1     |
| (b)             | (i) safety goggles/gauntlets/gloves/not splashing/eq;                                                                                                                                                   |                                                                                       | 1     |
|                 | (ii) balance;                                                                                                                                                                                           | condone 'scales'<br>ignore 'meter(s)'                                                 | 1     |
|                 | (iii) 74 (g);                                                                                                                                                                                           |                                                                                       | 1     |
|                 | (iv) density = mass/volume;                                                                                                                                                                             | allow any accepted letters for density, mass or volume<br>allow d, $\rho$ for density | 1     |
|                 | (v) substitution;<br><br>evaluation;<br>matching unit;<br><br>correct answer: $0.84 \text{ g/cm}^3$<br><br>e.g. density = mass / volume<br>density = $74/88$<br>density = $0.84 \text{ g/cm}^3$ to 2 sf | ECF for incorrect mass<br><br><br><br><br><br><br>allow 0.8409090...                  | 3     |
| (c)             | (particles) far apart / much further apart;<br>particles move with (much) higher speed / have higher <u>kinetic</u> energy;<br>move (more) randomly;                                                    | allow KE for kinetic energy                                                           | 3     |

Total for Question 1 = 13 marks

| Question number | Answer                                                                                                                                                                                                                            | Notes                                                                                                                                    | Marks |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 2 (a)           | plate loses negatively charged particles;<br>(loses) electrons;                                                                                                                                                                   | reject response that infers positive electrons<br><br>'plate loses electrons' scores 2 marks.                                            | 2     |
| (b) (i)         | plate and ball have same (sign) charge;<br>(so there is a) repulsive force on the ball (from that plate);                                                                                                                         | accept 'attractive force from other plate' /<br>'like charges repel' /<br>'plate X is negative and opposite charges attract' for 2 marks | 2     |
| (ii)            | metal is a conductor;                                                                                                                                                                                                             | allow 'it conducts'                                                                                                                      | 1     |
| (c) (i)         | charge (transferred) = current x time;                                                                                                                                                                                            | allow standard symbols and rearrangements<br>e.g. $I = Q / t$<br>reject C or c for current                                               | 1     |
| (ii)            | substitution and rearrangement;<br>evaluation;<br>correct answer: $1.1 \times 10^{-5}$ (A)<br><br>e.g.<br>charge = current x time<br>current = charge / time = $5.1 \times 10^{-6} / 0.45$<br>current = $1.1(3) \times 10^{-5}$ A | allow factor of 2 either way<br>i.e. $\{2.2 / 0.55\} \times 10^{-5}$<br>POT error scores -1                                              | 2     |
| (iii)           | any ONE of: <ul style="list-style-type: none"> <li>larger charge transfer (per trip);</li> <li>ball gains more kinetic energy;</li> <li>more trips per second;</li> </ul>                                                         | ignore 'V=IR' argument                                                                                                                   | 1     |
| (iv)            | ammeter;                                                                                                                                                                                                                          |                                                                                                                                          | 1     |

Total for Question 2 = 10 marks

| Question number | Answer                                                                                                                                                                                                                                                                                                                          | Notes                                                                         | Marks |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------|
| 3 (a)           | centre of gravity;                                                                                                                                                                                                                                                                                                              | allow centre of mass                                                          | 1     |
| (b) (i)         | C (230 N);<br><br>A is not correct as this is the mass of the bin;<br>B is not correct as this has the incorrect unit for force;<br>D is not correct as the mass has been converted to grams before being multiplied by $g$ .                                                                                                   |                                                                               | 1     |
| (ii)            | (in equilibrium) sum of clockwise moments = sum of anticlockwise moments;                                                                                                                                                                                                                                                       | condone 'clockwise moment = anticlockwise moment'                             | 1     |
| (iii)           | calculation of moment of weight or expression for moment of $F$ ;<br>equating moments;<br>rearrangement for $F$ ;<br>correct evaluation of $F$ ;<br><br>e.g. moment of $F = 0.98 \times F$<br>moment of weight = $230 \times 0.37$<br>$230 \times 0.37 = 0.98 \times F$<br>$F = 230 \times 0.37 / 0.98$<br>$F = 87 \text{ (N)}$ | ignore POT for this MP<br><br><br><br><br><br><br>allow 86.8, 86.84, 86.83... | 4     |
| (iv)            | Magnitude=candidate's answer for (iii);<br>direction: down(wards);                                                                                                                                                                                                                                                              | expect 87 N                                                                   | 2     |

Total for Question 3 = 9 marks

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                           | Notes                             | Marks |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------|
| 4 (a)           | <p>any FOUR from:</p> <p>advantages:</p> <p>MP1 no carbon (dioxide) emissions;</p> <p>MP2 no contribution to { global warming / greenhouse effect / acid rain };</p> <p>MP3 is renewable;</p> <p>MP4 low maintenance/no moving parts;</p> <p>disadvantages:</p> <p>MP5 needs a favourable climate;</p> <p>MP6 needs long days /doesn't work at night;</p> <p>MP7 needs a lot of space;</p> <p>MP8 cannot respond to rapid changes in demand;</p> | ignore unnamed 'greenhouse gases' | 4     |
| (b)             | <p>d.c. travels in one direction only;</p> <p>a.c. changes direction <b>frequently/continuously</b>;</p>                                                                                                                                                                                                                                                                                                                                         |                                   | 2     |

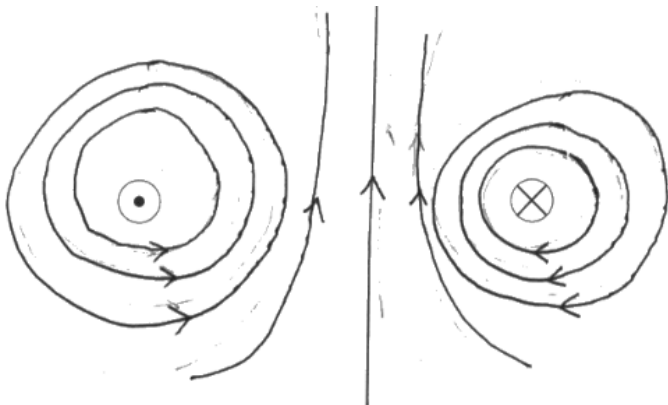
Total for Question 4 = 6 marks

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                     | Notes                                                                                                                         | Marks |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------|
| 5 (a)           | <p>use/substitution of distance = average speed x time;</p> <p>total distance travelled = 2 x distance to plane;</p> <p>evaluation of distance to at least 2s.f.;</p> <p>e.g.<br/> total distance = <math>1.9 \times 10^{-3} \times 3.0 \times 10^5</math><br/> total distance = 570 km = 2 x distance to plane<br/> distance to plane = <math>570/2 = 285</math> (km)</p> | <p>reject use of <math>v=f\lambda</math></p> <p>allow idea that time required is half of total time.</p>                      | 3     |
| (b)             | <p>substitution into given equation <math>\Delta\lambda/\lambda = v/c</math> ;</p> <p>rearrangement;</p> <p>evaluation;</p> <p>e.g. <math>1.1 \times 10^{-6} / 1.2 = v/3 \times 10^8</math><br/> <math>v = 3 \times 10^8 \times 1.1 \times 10^{-6} / 1.2</math><br/> <math>v = 280</math> (m/s)</p>                                                                        | <p>-1 POT error</p> <p>allow ecf from wrong change in wavelength</p> <p>condone premature rounding</p> <p>allow 275 (m/s)</p> | 3     |

Total for Question 5 = 6 marks

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                    | Notes                                                                                                                                                                                         | Marks |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 6 (a) (i)       | reference to reflection or absorption;<br>white is a good reflector/poor absorber;                                                                                                                                                                                                                                                                        | ignore reference to emission                                                                                                                                                                  | 2     |
| (ii)            | any TWO from:<br>air is a (good) insulator / poor conductor;<br>reduction in convection;<br>idea that trapped air cannot circulate;                                                                                                                                                                                                                       |                                                                                                                                                                                               | 2     |
| (b)             | substitution into given equation (energy = $mc\Delta\theta$ );<br>rearrangement;<br>evaluation of temperature change;<br>evaluation of final temperature;<br><br>e.g.<br>$210\,000 = 4.5 \times 4200 \times \Delta T$<br>$\Delta T = 210\,000 / (4.5 \times 4200)$<br>$\Delta T = 11\ (^{\circ}\text{C})$<br>final temperature = $46\ (^{\circ}\text{C})$ | ecf incorrect temp change<br><br>accept $35\ (^{\circ}\text{C})$ for 3 marks if supported with working that shows evidence of a temperature change of $11 \times 10^{-3}\ (^{\circ}\text{C})$ | 4     |

Total for Question 6 = 8 marks

| Question number | Answer                                                                                                                                                                                                                                                                                 | Notes                                                     | Marks |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------|
| 7 (a)           | EITHER<br>plotting compass;<br>multiple compasses or repeated use of single compass;<br>joining up of dots/idea of compasses forming continuous line(s);<br><br>OR<br><br>iron filings;<br>sprinkled;<br>card tapped;                                                                  | all marks can be awarded for a correctly labelled diagram | 3     |
| (b)             | one field line passing through middle from top to bottom;<br>circular/elliptical field lines around wires;<br>field line spacing increasing further from wires;<br>arrows correct direction;<br><br> |                                                           | 4     |
| (c) (i)         | A;<br><br>B is not right as the force cannot be generated by the LHR.<br>C and D are not right as the force cannot be parallel to the magnetic field.                                                                                                                                  |                                                           | 1     |
| (ii)            | current (in one wire) and field (from other wire) both reversed;<br>the two effects cancel (so no change);                                                                                                                                                                             | DOP<br>allow relevant reference to (F)LHR                 | 2     |

Total for Question 7 = 9 marks

| Question number | Answer                                                                                                                                                                                                                                                                                                                                               | Notes                                                                                                       | Marks |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------|
| 8 (a)           | step-down;                                                                                                                                                                                                                                                                                                                                           |                                                                                                             | 1     |
| (b)             | $\frac{\text{input (primary) voltage}}{\text{output (secondary) voltage}} = \frac{\text{primary turns}}{\text{secondary turns}};$                                                                                                                                                                                                                    | allow V for voltage, n or N or t or T for turns, allow subscripts 'i' and 'o' or 'p' and 's' or '1' and '2' | 1     |
| (c) (i)         | substitution into correct turns ratio equation;<br>rearrangement to find $V_s$ ;<br>substitution into $V_p I_p = V_s I_s$ ;<br><br>rearrangement to give $I_s$ ;<br>evaluation;<br><br>e.g.<br>$230/V_s = 16/4$<br>$V_s = 230 / 4 = 57.5 \text{ (V)}$<br>$230 \times 11 = 57.5 \times I_s$<br>$I_s = 230 \times 11 / 57.5$<br>$I_s = 44 \text{ (A)}$ | ecf from incorrect $V_s$                                                                                    | 5     |
| (ii)            | D;<br><br>A, B and C are all rated below the nominal current of the input coil, so would all 'blow' instantly.                                                                                                                                                                                                                                       |                                                                                                             | 1     |

Total for Question 8 = 8 marks