

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: <u>energy (transferred)</u> 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"> • prevents electrocution / shock • flow of charge as current • current to ground <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 EITHER Idea that 2.92 A is close to 3A, making 3A fuse a poor choice for soldering iron 'B'; OR 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. $P=IV$, $I=P/V$</p> <p>Ignore s.f. $30 \div 230 = 0.13$ (A) $70 \div 24 = 2.9$ (A)</p> <p>Allow $70 \div 230 = 0.30$ (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 Ignore equations</p> <p>Allow input and output (coils) Ignore: magnet</p> <p>Allow:</p> <ul style="list-style-type: none"> • reverse argument • clear indication of relative turns on diagram (judge by eye) • appropriate numbers 	3
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Total for question 2 = 10 marks

Question number		Answer	Notes	Marks
3	(a) (i)	90 (K)		1
	(ii)	<p>Any three of</p> <p>MP1 Idea that particles/molecules move apart;</p> <p>MP2 Idea that particles/molecules gain (kinetic) energy;</p> <p>MP3 Idea that particles/molecules move more freely;</p> <p>MP4 Idea that particles/molecules leave the liquid;</p>	<p>Ignore: molecules vibrate</p> <p>Allow: molecules spread out, take up more space</p> <p>May be shown on labelled diagram</p> <p>Allow: idea of moving faster</p> <p>Ignore : 'move more'</p> <p>Allow bonds break</p> <p>Ignore unqualified 'move more'</p> <p>Allow escape</p> <p>Ignore evaporate</p>	3
	(b) (i)	<p>Any two of</p> <p>MP1 radiation / infrared;</p> <p>MP2 Idea of reflection;</p> <p>MP3 Idea of little/no absorption;</p> <p>MP4 Idea of poor emission;</p>	<p>Allow IR</p> <p>Allow bad radiator</p>	2
	(ii)	<p>Any two of</p> <p>(in a vacuum there are) no atoms/molecules/particles;</p> <p>so no/poor conduction;</p> <p>so no/little convection (currents);</p>	<p>Allow:</p> <p>no 'medium'</p> <p>no 'material'</p> <p>There are no molecules to conduct = 2 marks</p> <p>There are no molecules to convect = 2 marks</p>	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: warm air won’t fall, cool air won’t rise Ignore density arguments Allow: gas is a poor conductor Allow: flask would burst if it had a lid</p>	2
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Total for question 3 = 10 marks

Question	Answer	Notes	Marks
4 (a) (i)	Momentum = mass x velocity	Allow abbreviations and rearrangements e.g. $p=mv$, mass = $\frac{\text{momentum}}{\text{velocity}}$	1
(ii)	Substitution into correct equation; Calculation; e.g. $17\,000 \times 13$ $220\,000$ (kg m/s)	Allow 221 000	2
(b) (i)	Answers should be in the context of momentum (when the lorry stops) the load still has momentum; Idea that lorry stops in a shorter time; OR Idea that load takes more time to stop;	Allow: $(mv-\mu) = Ft$ Allow for TWO marks lorry loses momentum more quickly;; OR load loses momentum more slowly;;	2
(ii)	MP1 Centre of gravity is closer to the front of the lorry; MP2 Clockwise and anticlockwise moments equal; MP3 Increase in force related to decrease in distance (to provide balancing moment);	Ignore action and reaction arguments Allow: centre of mass nearer front of lorry there is more weight near the front of the lorry / near B C of G further from rear (wheel) Allow: <ul style="list-style-type: none"> Moments are balanced total moment = 0 	3
(c) (i)1	Pressure = $\frac{\text{force}}{\text{area}}$;	Allow abbreviations and rearrangements, e.g. $P=F/A$, force = pressure x area	1
(ii)2	Substitution into correctly rearranged formula; Calculation; e.g. $53\,000 \div 390\,000$ 0.14 (m ²)	0.136 0.135897 Allow 1400 cm ²	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; 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 5 bars correctly plotted;; If only 3 bars correctly plotted allow 1 mark for plotting</p> <table border="1"> <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	<p>voltage in V (or V/V) AND all bars (or points) labelled Ignore orientation Allow non-zero origin</p> <p>Bar length plotted to nearest $\frac{1}{2}$ small square</p> <p>ALL data plotted correctly as floating "x's" gets only one mark for plotting</p> <p>Reject both plotting marks if a line graph is drawn (only scale and axes marks are available in this case)</p>
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 MP1 idea that the visible spectrum is a sequence, with the end colours identified; MP2 Colour correctly related to wavelength (e.g. red has longest wavelength); MP3 Colour correctly related to voltage (e.g. blue needs highest voltage);</p>	<p>Red to blue (start either end) Allow ROYGBIV etc</p> <p>Wavelength (or frequency) correctly related to voltage = 2 marks, e.g. f increases with V 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)		Conversion to seconds; Substitution into correctly rearranged equation; Calculation; e.g. (time =) 60 (s) $\frac{39\,000\,000}{(490 \times 60)}$ 1300 (V)	No mark for stating the formula, since $E = I \times V \times t$ is given on page 2 60 seen in working 1330, 1327, 1326.5 (V) Correct answer without working scores full marks Allow 1.3 kV for THREE marks Allow Power of Ten error , for a maximum of TWO marks e.g. 1.326×10^{-3} , 1.33, 130	3
(ii)		Any four of MP1 (High voltage leads to) low current; MP2 mention of a relevant equation e.g. $P=IV$, $P=I^2R$; MP3 Less energy is lost (from the wires); MP4 More efficient; MP5 can use thinner wires;	Allow less heat loss Ignore cost argument Allow: Can transmit the energy further	4
(c) (i)		Current that changes direction (continuously); 100 times per second;	Allow switches from +ve to -ve. Allow 50 times/cycles per second. Allow time period e.g. 0.01 s, 0.02 s, 1/50s	2
(ii)		Transformers change the voltage / current; Transformers use alternating current / a.c.;	Allow step-up, step-down Allow reverse argument	2

Total for question 6 = 12 marks

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