

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

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. $17\,000 \times 13$ $220\,000 \text{ (kg m/s)}$	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. $53\,000 \div 390\,000$ $0.14 \text{ (m}^2\text{)}$	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 ;	2													
		(ii)	Axes labelled - quantity and unit ; Linear scale such that longest bar occupies at least half the grid; Plotting ---ignore order of bars 5 bars correctly plotted;; If only 3 bars correctly plotted allow 1 mark for plotting <table><tr><th>Colour of light from LED</th><th>Minimum voltage in V</th></tr><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></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	voltage in V (or V/V) AND all bars (or points) labelled Ignore orientation Allow non-zero origin Bar length plotted to nearest ½ small square ALL data plotted correctly as floating “x’s” gets only one mark for plotting Reject both plotting marks if a line graph is drawn (only scale and axes marks are available in this case)	4
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)	Student is right/wrong - no mark 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);	Red to blue (start either end) Allow ROYGBIV etc Wavelength (or frequency) correctly related to voltage = 2 marks, e.g. f increases with V λ increases with 1/V	2												

Question number		Answer	Notes	Marks
6 (a)		C (kinetic energy to electrical energy)		1
(b) (i)		<p>Conversion to seconds; Substitution into correctly rearranged equation; Calculation; e.g. (time =) 60 (s) $\frac{39\,000\,000}{(490 \times 60)}$ 1300 (V)</p>	<p>No mark for stating the formula, since $E = I \times V \times t$ is given on page 2</p> <p>60 seen in working</p>	3
(ii)		<p>Any four of</p> <p>MP1 (High voltage leads to) low current;</p> <p>MP2 mention of a relevant equation e.g. $P=IV$, $P=I^2R$;</p> <p>MP3 Less energy is lost (from the wires);</p> <p>MP4 More efficient;</p> <p>MP5 can use thinner wires;</p>	<p>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</p> <p>Allow less heat loss</p> <p>Ignore cost argument</p> <p>Allow: Can transmit the energy further</p>	4
(c) (i)		<p>Current that changes direction (continuously);</p> <p>100 times per second;</p>	<p>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</p>	2
(ii)		<p>Transformers change the voltage / current;</p> <p>Transformers use alternating current / a.c.;</p>	<p>Allow step-up, step-down</p> <p>Allow reverse argument</p>	2

Total for question 6 = 12 marks

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