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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)		Any four of: MP1 Use of ratemeter / scaler / counter; MP2 Idea of measuring <u>background</u> radiation e.g. background count / correction /subtraction; MP3 A safety precaution (based on distance or absorption) e.g. use of tongs / shielding; MP4 A controlled variable (time / distance / positioning) e.g. “source near/by/to detector”, “for a minute”; MP5 A practical consideration e.g. repeat / average / reset (scaler); MP6 Mention of becquerel / Bq	Allow description e.g. “count the clicks” Allow Geiger counter Ignore GM detector or tube Ignore descriptions of GM tube Allow “stand back”, “wear gloves / protective clothing” “do not point source at people” Ignore “counts per minute” Ignore: mention of anomalies Accept phonetic spellings	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: energy (transferred) / 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: • 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 ÷ 230 = 0.13 (A) 70 ÷ 24 = 2.9 (A) Allow 70 ÷ 230 = 0.30 (A) Allow reverse arguments, e.g. "lower value fuse would melt" Allow ecf from incorrect calculation	3

(ii)		Any three of MP1 primary AND secondary (coils); MP2 (soft) iron core; MP3 primary/input (coil) has more turns; MP4 further structural detail e.g. insulated wire, core laminations;	May be shown on a labelled diagram Ignore equations Allow input and output (coils) Ignore: magnet Allow: • reverse argument • clear indication of relative turns on diagram (judge by eye) • appropriate numbers	3

Total for question 2 = 10 marks

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

(c)		Any two of MP1 Idea that there is cold gas/air/oxygen just above the liquid (surface); MP2 Idea that the gas/air/oxygen in the room is warmer; MP3 Idea that convection currents in air (above liquid surface) unlikely; MP4 Idea that (evaporated) oxygen /air / gas would insulate the surface; MP5 Idea that oxygen/gas would build up pressure in a sealed vessel;	Ignore "heat rises" 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	2

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 = momentum / velocity	1
(ii)		Substitution into correct equation; Calculation; e.g. 17 000 x 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: • Moments are balanced • total moment = 0	3
(c) (i)1		Pressure = force / 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 ÷ 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)		Axes labelled- quantity and unit ;	voltage in V (or V/V) AND all bars (or points) labelled	4
		Linear scale such that longest bar occupies at least half the grid;	Ignore orientation Allow non-zero origin	
		Plotting---ignore order of bars 5 bars correctly plotted;; If only 3 bars correctly plotted allow 1 mark for plotting	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)	
(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

Colour of light from LED	Minimum voltage in V
Red	1.7
Blue	3.6
Yellow	2.1
Orange	2.0
Green	3.0

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 x V x 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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