

Mark Scheme (Results)

Summer 2013

International GCSE
Physics (4PH0) Paper 2P

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

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk for our BTEC qualifications.

Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

If you have any subject specific questions about this specification that require the help of a subject specialist, you can speak directly to the subject team at Pearson.

Their contact details can be found on this link: www.edexcel.com/teachingservices.

You can also use our online Ask the Expert service at www.edexcel.com/ask. You will need an Edexcel username and password to access this service

Pearson: helping people progress, everywhere

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2013

Publications Code UG037250

All the material in this publication is copyright

© Pearson Education Ltd 2013

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
------	--	--	---	---

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
-----	--	--	--	---

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 ½ 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

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467

Fax 01623 450481

Email publication.orders@edexcel.com

Order Code UG037250 Summer 2013

For more information on Edexcel qualifications, please visit our website
www.edexcel.com

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual




Llywodraeth Cynulliad Cymru
Welsh Assembly Government

