

Mark Scheme (Results)

Summer 2010

IGCSE

IGCSE Physics (4420) Paper 03
IGCSE Science (Double Award) (4437) Paper 09

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IGCSE PHYSICS 4420/03 - SUMMER 2010

aps	accept phonetic spelling
dna	do not accept
dop	dependent on previous
ecf	error carried forward
nwn	no working necessary
owtte	or words to that effect
pot	power of ten

Question Number	Acceptable Answers	Extra Information	Mark
1(a)(i)	six/6	aps	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
1(a)(ii)	0.8 (N)	ecf from (a)(i) e.g. $(5 \times 0.1) + 0.2 = 0.7$ (N) allow (1) for correct method $(n \times 0.1) + 0.2$ but wrong calculation or wrong n (i.e. not 6 or ecf) e.g. $(6 \times 0.1) + 0.2 = 0.7$	
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
1(b)(i)	21.2 (cm)		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
1(b)(ii)	9 (mm)	allow (1) for correct method e.g. $221 - \text{answer to (b)(i) in mm}$ allow (1) for 0.9 (cm) or other pot error	
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
1(c)(i)	all the range from the origin to the end of the straight line section	expect a clear mark at the <i>top</i> of the section and an indication whether the section is above or below this mark do not credit a response which exceeds this range	
			(1)
1(c)(ii)	<u>starts at the origin</u> , similar to original but steeper must not cut original line	allow a (steep) curve (but not if it bends back on itself)	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
2(a)(i)	measuring cylinder graduated cylinder	aps dna cylinder measuring tube beaker measuring beaker	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
2(a)(ii)	38 (cm ³)	dna 39	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
2(a)(iii)	56 (g)	dna 056 56.0 56.00	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
2(b)(i)	straight line between both points	must use ruler/straight edge	1
	<u>28(g)</u>	dop must be intercept of graph	1
			(2)
2(b)(ii)	<u>y-step</u> x step	ignore size of triangle	1
	= 0.8 (g/cm ³)	exception $\frac{3}{4} = 0.75$	1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
2(b)(iii)	any three (1) each <ol style="list-style-type: none"> 1. can plot more points 2. can draw line of best fit/straight line rather than curve 3. reason why two points is unsatisfactory 4. extends the range 5. increases reliability 6. identifies anomalous results 7. repeat or ignore anomalies 8. can see if density remains constant 	ignore more accurate can take average ensures no anomalies	
			(3)

Question Number	Acceptable Answers	Extra Information	Mark
3(a)(i)	metre rule(r) 100 cm rule(r) measuring tape tape measure rule(r) metre stick		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
3(a)(ii)	<u>difficulty</u> measuring to the centre/filament of the lamp	owtte e.g. 'you cannot put the metre rule to the filament' ignore references to orientation of metre rule	1
	any two (1) each: <u>explanation</u> measure between glass and filament add to reading (of rule) view from the side or top mark/note position level with filament (on glass) mark/note centre of base measure from the point specified dop while lamp is off/before lamp is on	dna remove glass	2
			(3)

Question Number	Acceptable Answers	Extra Information	Mark
3(b)	<i>either</i> so that <u>only</u> light from the lamp		1
	affects the panel / cells / voltage / results / readings	ignore experiment(al) / test / investigation	1
	<i>or</i> so that there is no background / external light		1
	to affect the panel / cells / voltage	ignore experiment(al) /	1

	/ results /readings	test /investigation															
			(2)														
Question Number	Acceptable Answers	Extra Information	Mark														
3(c)(i)	<table border="1"> <thead> <tr> <th>d/cm</th> <th>V/mV</th> </tr> </thead> <tbody> <tr> <td>14</td> <td>190</td> </tr> <tr> <td>30</td> <td>104</td> </tr> <tr> <td>38</td> <td>80</td> </tr> <tr> <td>50</td> <td>56</td> </tr> <tr> <td>70</td> <td>34</td> </tr> <tr> <td>90</td> <td>26</td> </tr> </tbody> </table> <p>appropriate headings</p> <p><u>all</u> in order</p> <p>units given in heading or in body of table centimetres/cm and as millivolts/mV</p>	d/cm	V/mV	14	190	30	104	38	80	50	56	70	34	90	26	<p>columns either way round</p> <p>d and V are minimum description of variables accept distance,length, voltage, millivoltage, p.d. , potential difference, <u>millivoltmeter</u> reading, emf dna volts, millivolts</p> <p>ascending or descending</p> <p>seen at least once and with no contradiction</p>	<p>1</p> <p>1</p> <p>1</p>
d/cm	V/mV																
14	190																
30	104																
38	80																
50	56																
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			(3)														

Question Number	Acceptable Answers	Extra Information	Mark
3(c)(ii)	<p>both axes labelled correctly and with correct units</p> <p>all points plotted correctly to half a small square</p> <p>curve of best fit</p>	<p>same criteria as for column headings</p> <p>each incorrect or missing (-1) down to (0) for points</p> <p>do not credit dot to dot with or without the use of a ruler</p>	<p>1</p> <p>2</p> <p>1</p>
			(4)
3(c)(iii)	<p>correct reading from candidate's <u>line</u> to within 1 mm (half a small square)</p>		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
4(a)	...is the same at every/all point(s) along the wire <i>or</i> constant	owtte dna uniform	
			(1)
4(b)	switch <i>either</i> identified as a push or button switch <i>or</i> on/closed	dop	1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
4(c)(i)	meter X = 4.6 meter Y = 8.2	allow 4.60 allow 8.20	1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
4(c)(ii)	Y ...in series (with the nichrome wire)	allow not in parallel X is in parallel X is a voltmeter	1
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
4(d)(i)	<u>0.32</u> 2.7 <u>0.12</u> (Ω)	scores both marks nwn allow (1) if clear evidence that the correct calculation has been carried out for example 0.1185185185...	1 1
			(2)
4(d)(ii)	data is (only) correct to two sig. figs (so) the answer cannot be correct to more than two sig. figs.	dna decimal places	1 1
			(2)

4(d)(iii)	$\frac{0.12}{0.26}$ $=(0).46$	ecf for R from (d)(i) scores both marks nwn allow (1) for (0).0046 or other pot error no significant figure penalty 0.461538461... allow ecf	1 1
			(2)

4(d)(iv)	Any two points for (1) each <ul style="list-style-type: none"> • calculation is based on only one (pair of) result(s) • (percentage) error/inaccuracy/unreliability (in the original measurements) is likely to be carried forward • any quantitative reference to uncertainty in length, voltage or current • no other value to compare it with 		
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
4(e)(i)	any one point error reading the meter (s) / remembering reading/recording reading reading is changing owtte	dna human error not accurate	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
4(e)(ii)	<p>action (1)</p> <p>reason (1)</p> <p>additional detail (1)</p>	<p><i>examples</i></p> <p>use a fridge/heat source / water bath / fan / air conditioning /ice / boiling water / small current etc</p> <p>cool / heat up / remove heat /reduce heating owtte</p> <p>safety feature / experimental detail /</p>	
			(3)

PAPER TOTAL: 50 MARKS

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