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Mark Scheme (Results)
Summer 2010

IGCSE

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

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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 x 0.1) + 0.2 = 0.7 (N) allow (1) for correct method (n × 0.1) + 0.2 but wrong calculation or wrong n (i.e. not 6 or **ecf**) e.g. (6 x 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 – 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 *top* 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 <u>28</u>(g)	must use ruler/straight edge **dop** must be intercept of graph	1 1
			(2)
2(b)(ii)	<u>*y*-step</u> *x* step = 0.8 (g/cm^3)	ignore size of triangle exception ¾ = 0.75	1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
2(b)(iii)	any three (1) each 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	**i**gnore 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)	*difficulty* measuring to the centre/filament of the lamp any two (1) each: *explanation* 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	**owtte** e.g. 'you cannot put the metre rule to the filament' ignore references to orientation of metre rule **dna** remove glass	1 2
			(3)

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

	/ results /readings	test /investigation	
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
3(c)(i)	<table><tr><th>*d*/cm</th><th>*V*/mV</th></tr><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></table>	columns either way round	
	appropriate headings	*d* and *V* are minimum description of variables accept distance,length, voltage, millivoltage, p.d. , potential difference, millivoltmeter reading, emf **dna** volts, millivolts	1
	all in order	ascending or descending	1
	units given in heading or in body of table centimetres/cm **and** as millivolts/mV	seen at least once and with no contradiction	1
			(3)

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

Question Number	Acceptable Answers	Extra Information	Mark
4(a)	…is the same at every/all point(s) along the wire *or* constant	**owtte** **dna** uniform	
			(1)
4(b)	switch *either* identified as a push or button switch *or* 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)	0.32 2.7 0.12 (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 • 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)	action (1) reason (1) additional detail (1)	*examples* use a fridge/heat source / water bath / fan /air conditioning /ice / boiling water / small current etc cool / heat up / remove heat /reduce heating **owtte** safety feature / experimental detail /	
			(3)

PAPER TOTAL: 50 MARKS

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