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Mark Scheme (Results)
June 2010

GCE

GCE Physics (6PH08) Paper 1

Unit 6B: Experimental Physics

International Alternative to Internal Assessment

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Summer 2010

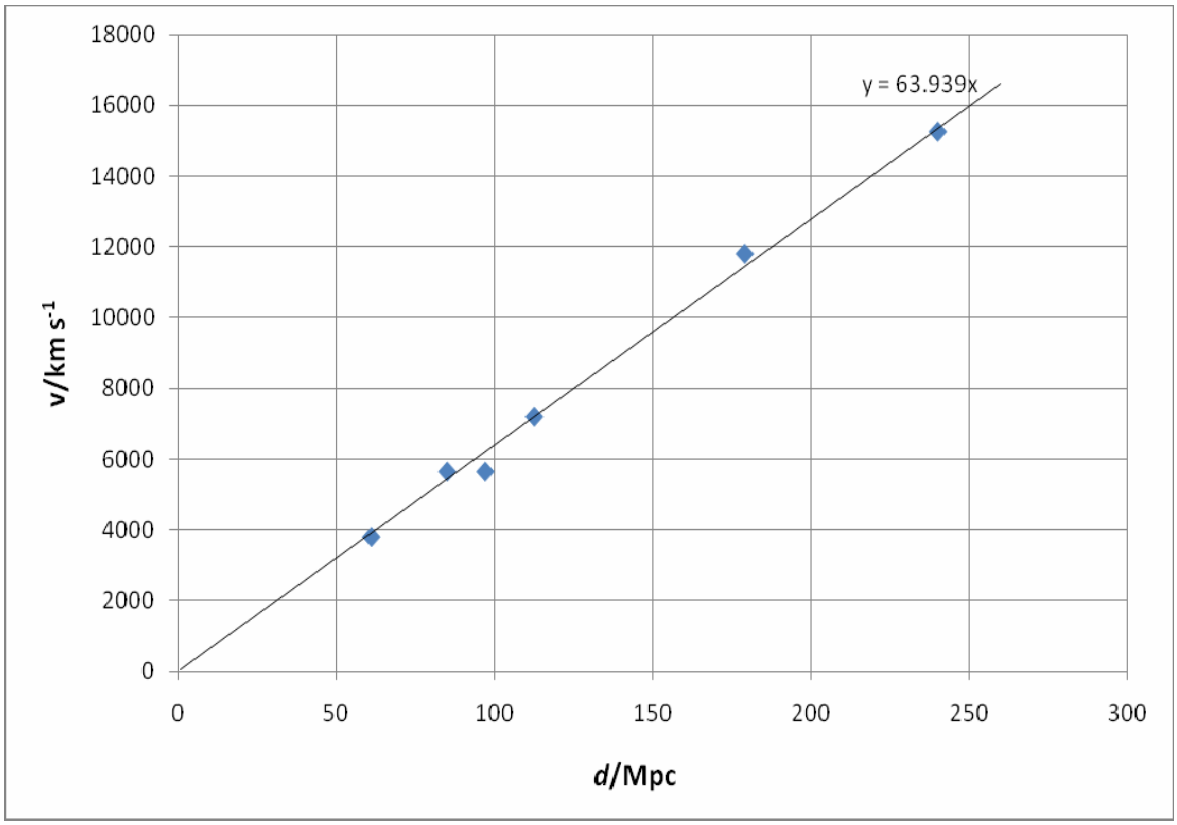
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Question Number	Answer	Mark
1 (a) (i)	Ignore the anomalous 0.77 OR add the four good readings and divide by four	**(1)**
(ii)	0.27 mm	**(1)**
(iii)	Divides 0.015 *or* 0.02 *or* 0.03 by their mean value to calculate correct percentage Example of calculation 0.02/0.27 = 7%	**(1)** **(1)**
1 (b) (i)	Use of $\pi r^2 l$ Produces correct answer with consistent unit Example of calculation $\pi(0.135 \times 10^{-3}\ m)^2 \times 663 \times 10^{-3}\ m = 3.80 \times 10^{-8}\ m^3$	**(1)** **(1)**
1 (b) (ii)	Use of mass/volume Answer to 2 s.f. with unit for density consistent with mass used Example of calculation $0.32 \times 10^{-3}\ kg / 3.80 \times 10^{-8}\ m^3 = 8400\ kg\ m^{-3}$	**(1)** **(1)**
1 (c)	Material is Nichrome Thickness is 32 (swg)	**(1)** **(1)**
	Total for question 1	**10**

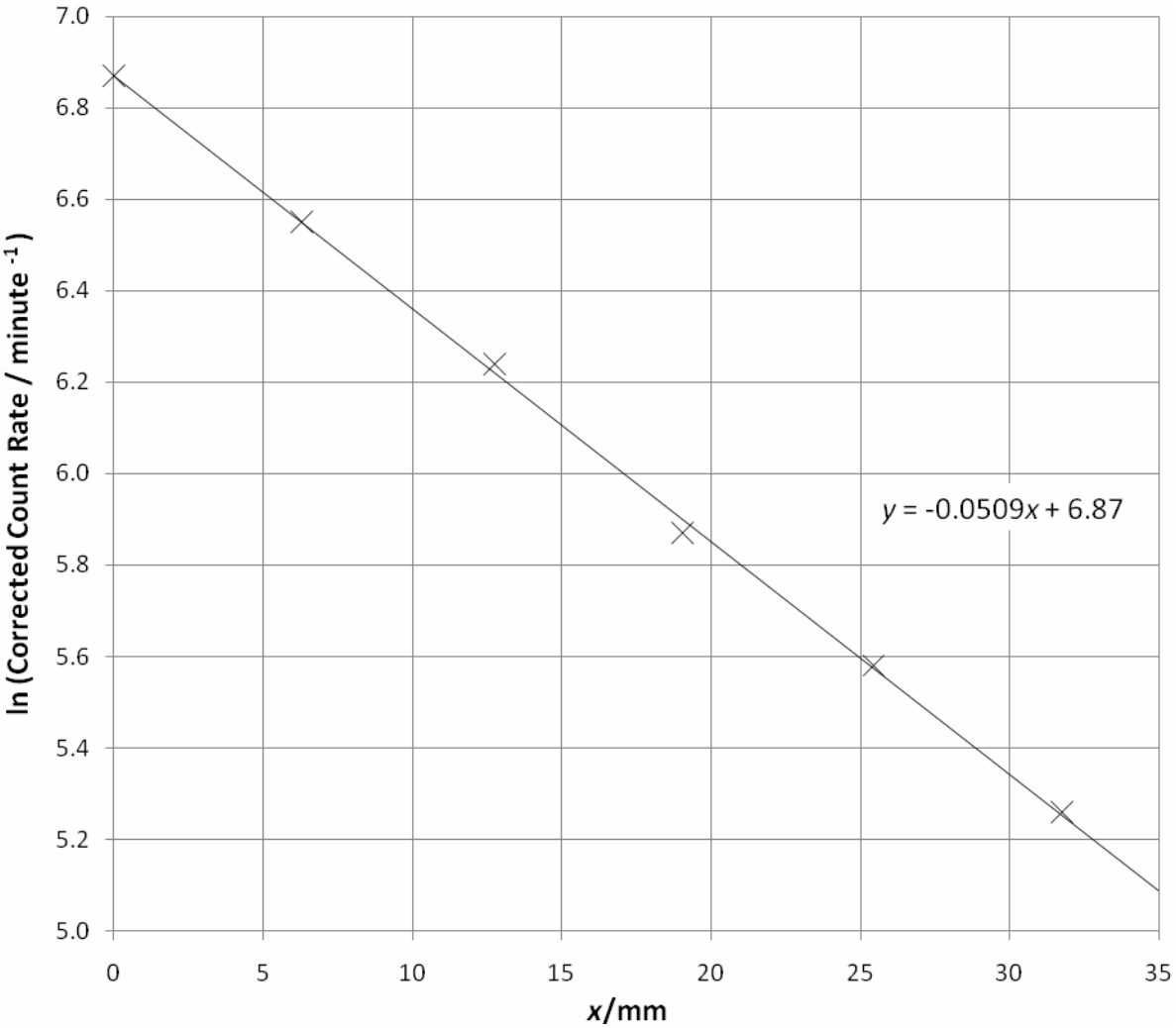
Question Number	Answer	Mark
2(a)	metre rule shown to be vertical with set square on floor OR set square aligned with weight and rule OR eye level with bottom of weight	**(1)**
2 (b)(i)	Uncertainty in *h* is 1 *or* 2 mm **(1)**	**(1)**
2(ii)	Uncertainty in *t* is 0.26 *or* 0.27 *or* 0.52 s only	**(1)**
2(iii)	$v = 0.584$ m s^{-1}	**(1)**
2(iv)	Calculates value for kinetic energy Example of calculation 0.5 x 0.96 kg x $(0.584 \text{ m s}^{-1})^2$ = 0.164 J	**(1)**
2(v)	Calculates % uncertainty in *h* and *t*(*or v*) Example of calculation 0.11% and 8.6% Combines % uncertainties Example of calculation 2 × 0.11% + 2 x 8.6 % = 17 %	**(1)** **(1)**
	Total for question 2	**7**

Question Number	Answer	Mark
3(a)	Red shift OR Doppler shift OR frequency of electromagnetic radiation/light OR wavelength of electromagnetic radiation/light	**(1)**
3(b)(i)	Line of best fit	**(1)**
3(b)(ii)	large triangle used gradient in range 62.0 - 66.0 with 2/3SF Example of calculation (16000 – 0)/(250 – 0) = 64 (ignore unit)	**(1)** **(1)**
3(c)(i)	Yes, as best fit line is straight and passes through origin OR No, as best fit line does not pass through origin	**(1)**
3(c)(ii)	Percentage difference calculated using 71 as denominator Example of calculation (71 – 64)/71 = 10%	**(1)**
	Total for question 3	**6**



Question Number	Answer	Mark
4 (a)	Record background count (rate) Place thick aluminium/thin lead between source & detector OR Distance greater than 25 cm between source and detector Count rate detected above background	**(1)** **(1)** **(1)**
4 (b)	Keep distance between the source and detector constant Any **four** from: • Record count (rate) for different thicknesses • Record count for a specified time • Subtract background count • Take several readings at each thickness • Measure thickness with micrometer screw gauge/vernier callipers Keep people away from source/use tongs to handle source /use tongs to handle lead sheets/ensure source held securely	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(Max 4)** **(1)**
4 (c)	$\ln A = -\mu x + \ln A_0$ **and** identifies $-\mu$ as gradient	**(1)**
4 (d)	Corrected count rate to at least 3SF and with correct units **and** ln A to at least 3SF and with correct units Axes labelled for suitable graph(ignore units) Suitable scales Plots Line	**(1)** **(1)** **(1)** **(1)** **(1)**
4 (e)	Triangle base at least 40 small squares and correct calculation of gradient (ignore sign and unit) μ = 0.050 to 0.052 mm^{-1} with unit and 2/3SF (no ecf) <u>Example of calculation</u> $(5.40 - 6.86)/(28.8 - 0) = 0.0507\ mm^{-1}$	**(1)** **(1)**
	Total for question 4	**17**

x/mm	Measured Count Rate / minute^{-1}	Corrected Count Rate / minute^{-1}	ln (Corrected Count Rate / minute^{-1})
0	1002	962	6.87
6.30	739	699	6.55
12.74	553	513	6.24
19.04	394	354	5.87
25.44	304	264	5.58
31.74	232	192	5.26



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