

Mark Scheme (Results) June 2010

GCE

GCE Physics (6PH08) Paper 1

Unit 6B: Experimental Physics

International Alternative to Internal Assessment



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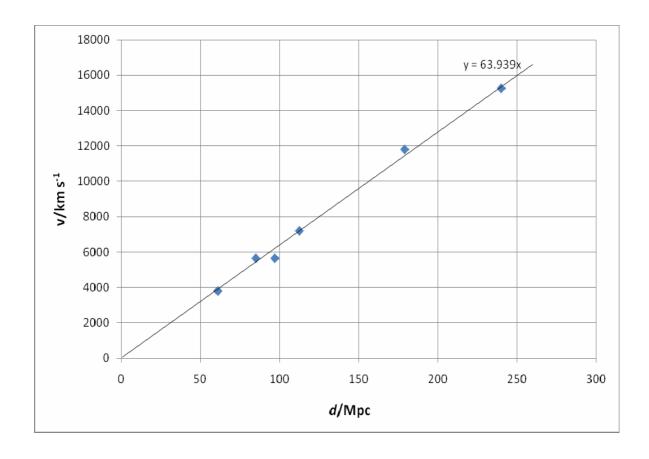
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| Question Number | Answer | Mark |
|--------------------|--|------|
| 1 (a) (i) | Ignore the anomalous 0.77 OR add the four good readings and divide by four | (1) |
| (ii) | 0.27 mm | (1) |
| (iii) | Divides 0.015 or 0.02 or 0.03 | (1) |
| | by their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

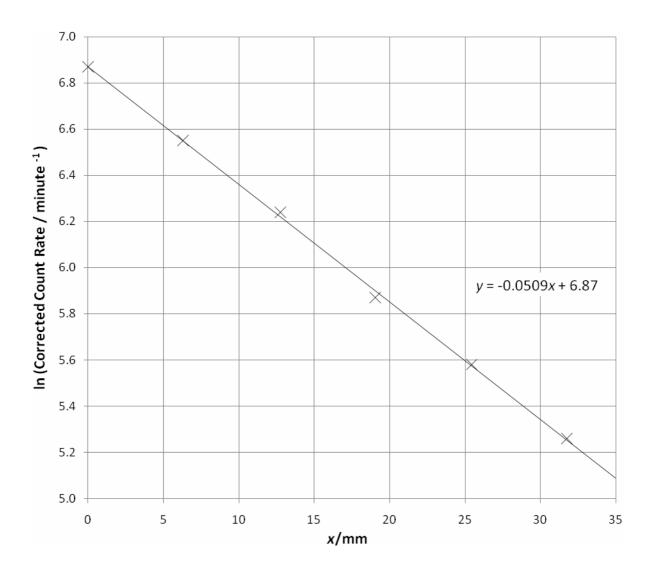
| Question Number | Answer | Mark | |
|--------------------|--|------------|--|
| 2(a) | metre rule shown to be vertical with set square on floor OR set square aligned with weight and rule OR eye level with bottom of weight | | |
| | | (1) (1) | |
| 2 (b)(i) | Uncertainty in h is 1 or 2 mm (1) | (1) | |
| 2(ii) | Uncertainty in t is 0.26 or 0.27 or 0.52 s only | | |
| 2(iii) | $V = 0.584 \text{ m s}^{-1}$ | (1) | |
| 2(iv) | Calculates value for kinetic energy | (1) | |
| | Example of calculation | | |
| | $0.5 \times 0.96 \text{ kg} \times (0.584 \text{ m s}^{-1})^2 = 0.164 \text{ J}$ | | |
| 2(v) | Calculates % uncertainty in h and $t(or v)$ | (1) | |
| | Example of calculation 0.11% and 8.6% | | |
| | Combines % uncertainties | (4) | |
| | Example of calculation 2 × 0.11% + 2 x 8.6 % = 17 % | (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 | (1) |
| | gradient in range 62.0 - 66.0 with 2/3SF | (1) |
| | Example of calculation $(16000 - 0)/(250 - 0) = 64$ (ignore unit) | |
| 3(c)(i) | Yes, as best fit line is <u>straight</u> 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 denominato | |
| | Example of calculation | |
| | (71 - 64)/71 = 10% | |
| | 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 | (1) |
| | Count rate detected above background | (1) |
| 4 (b) | Keep distance between the source and detector constant | (1) |
| | Any four from: Record count (rate) for different thicknesses | (1) |
| | Record count for a specified time | (1) |
| | Subtract background count | (1) |
| | Take several readings at each thickness | (1) |
| | Measure thickness with micrometer screw gauge/vernier callipers | (1) |
| | Keep people away from source/use tongs to handle source /use tongs to handle lead sheets/ensure source held | (Max 4) |
| | securely | (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 In A to at least 3SF and with correct units | (1) |
| | Axes labelled for suitable graph(ignore units) | (1) |
| | Suitable scales | |
| | Plots | (1) |
| | | (1) |
| | Line | (1) |
| 4 (e) | Triangle base at least 40 small squares and correct calculation of gradient (ignore sign and unit) | (1) |
| | μ = 0.050 to 0.052 mm ⁻¹ with unit and 2/3SF (no ecf) | (1) |
| | Example of calculation | |
| | $(5.40 - 6.86)/(28.8 - 0) = 0.0507 \text{ mm}^{-1}$ | |
| | Total for question 4 | 17 |

| x/mm | Measured Count Rate / minute ⁻¹ | Corrected Count Rate / minute ⁻¹ | In (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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