**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

GCE A Level

# MARK SCHEME for the November 2005 question paper

## 9702 PHYSICS

**9702/03** **Paper 3 (Practical Paper)** **maximum raw mark 25**

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

The minimum marks in these components needed for various grades were previously published with these mark schemes, but are now instead included in the Report on the Examination for this session.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

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**Part (b) (ii)** Absolute uncertainty = 1 mm (1 mark). **[2]**
Percentage uncertainty in first value of $d$ (i.e. ratio correct) (1 mark).

**(iii)** Measure each end of rule to see if distance above bench is the same (1 mark) **[2]**
Use of set square to ensure that half-metre rule is $90^{O}$ to bench (1 mark)

**Part (c)** Readings **[3]**
6 sets of readings scores 1 mark.
Repeated readings scores 1 mark.
Reasonable interval between values of $d$ (> 5 cm) scores 1 mark.
Help given by Supervisor, then -1. Excessive help then -2.

Quality of results **[2]**
Judge by scatter of points about the line of best fit.
6 trend points with little scatter scores 2 marks.
6 trend points with 'a fair amount of scatter' scores 1 mark.
5 trend points with little scatter scores 1 mark.
4 trend points (or less) scores zero.
Considerable scatter scores zero.

Column headings **[2]**
Apply to $F$ and $d$. One mark each.
The headings must contain a quantity and a unit.

Consistency **[2]**
Apply to $F$ and $d$ only. One mark each.
Values of $d$ must be given to the nearest millimetre.

**Part (d)** Axes **[1]**
Scales must be such that the plotted points occupy at least half the graph grid in both the $x$ and $y$ directions.
Scales must be labelled. Do not allow awkward scales.

Plotting of points **[1]**
Check a suspect plot. Circle and tick if correct.
If incorrect, show correct position with arrow, and -1.
Work to half a small square.

Line of best fit **[1]**
There must be a reasonable balance of points about the line of best fit.

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**Part (e)** Determination of gradient **[2]**
Δ used must be greater than half the length of the drawn line;
read-offs correct; ratio correct (one mark).
Gradient given as negative (one mark).

*y*-intercept **[1]**
The value may be read directly or calculated using $y = mx + c$ and a point on the line.

**Part (f)** Gradient equated with $-W/L$ **[1]**

Value of $W$ **[1]**

Significant figures in $W$ **[1]**
Accept 2 or 3 sf only.

Intercept equated with $\frac{mg}{2} + W$ **[1]**

Value of $m$ **[1]**

Units of $m$ and $W$ both correct **[1]**

**25 marks in total.**

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