

NOVEMBER 2002

GCE Advanced Subsidiary Level

MARK SCHEME

MAXIMUM MARK : 25

SYLLABUS/COMPONENT :9702 /3

**PHYSICS
(PRACTICAL (AS))**



UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

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Measurements

- M1** Measurements 6
Write the number of readings as a ringed total by the results table.
One mark for each set of readings to a maximum of 6 marks
Check a value for T . If incorrect then -1.
- M2** Repeated readings 1
For each value of T there must be at least two values of t .
An average value must be calculated.
- M3** At least half the raw times > 10 s 1
- M4** Quality of results 1
Judge by scatter of points about the line of best fit.

Results

- R1** Column headings 1
Each column heading must contain a quantity and a unit.
- R2** Consistency 1
Apply to t and d .
Values of d must be given to the nearest millimetre.
Values of t must be given to the same number of decimal places.
Do not allow t to be given to a whole number of seconds or 0.001 s.
- R3** Sf in k 1
Accept two or three significant figures only.

Graphical work

- G1** Axes 1
Scales must be such that the plotted points occupy at least half the graph grid in both the x and y directions.
Sensible scales must be used (i.e. 2:10 or 5:10 etc.)
- G2** Plotting of points 1
Write the number of plots as a ringed number on the graph grid.
All observations must be plotted.
The plots must be accurate to half a small square.
- G3** Line of best fit 1
Judge by scatter of points about the line of best fit.
Do not allow a straight line to be drawn through a curved trend.

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G4 Determination of gradient 1
 The hypotenuse of the triangle must be greater than half the length of the line which has been drawn.
 Check the read-offs.

G5 Intercept 1
 The value may be read or calculated from $y = mx + c$.

Analysis

A1 k = candidate's gradient 1

A2 c = candidate's y -intercept 1

A3 Unit of k and unit of c correct 1

A4 Sensible suggestions relating to direct proportionality 2
 One mark for 'straight line' ideas.

A5 Correct working to give period when $d = 5$ mm 1

A6 Oscillations are too quick to time manually 2
 Magnets may stick together at this small separation
 One mark each.

25 marks in total

Special cases

S1 Graph gives a clear curved trend of plots;
M4 = 0; G3 = 0 (if straight line drawn); A4 can only score 1/2 max.

S2 Negative value of T when $d = 5$ mm;
A5 = 0. Allow ecf into A6 if possible.

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Sample results.

$20T_1/s$	$20T_2/s$	$20T_{av}/s$	T/s	d/cm
26.6	27.0	26.8	1.34	9.7
20.9	20.7	20.9	1.04	7.6
17.2	17.2	17.2	0.860	6.3
13.8	13.7	13.8	0.688	5.1
9.6	9.6	9.6	0.465	3.6
6.4	6.5	6.5	0.324	2.3

Gradient = 0.143

y-intercept = -0.04

Hence $k = 0.143 \text{ s cm}^{-1}$ and $c = -0.04 \text{ s}$