

**NOVEMBER 2002**

**GCE Advanced Subsidiary Level**

**MARK SCHEME**

**MAXIMUM MARK : 25**

**SYLLABUS/COMPONENT :9702 /3**

**PHYSICS  
(PRACTICAL (AS))**



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### Measurements

<b>M1</b>	Measurements 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.	<b>6</b>
<b>M2</b>	Repeated readings For each value of $T$ there must be at least two values of $t$ . An average value must be calculated.	<b>1</b>
<b>M3</b>	At least half the raw times $> 10$ s	<b>1</b>
<b>M4</b>	Quality of results Judge by scatter of points about the line of best fit.	<b>1</b>

### Results

<b>R1</b>	Column headings Each column heading must contain a quantity and a unit.	<b>1</b>
<b>R2</b>	Consistency 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.	<b>1</b>
<b>R3</b>	Sf in $k$ Accept two or three significant figures only.	<b>1</b>

### Graphical work

<b>G1</b>	Axes 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.)	<b>1</b>
<b>G2</b>	Plotting of points 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.	<b>1</b>
<b>G3</b>	Line of best fit Judge by scatter of points about the line of best fit. Do not allow a straight line to be drawn through a curved trend.	<b>1</b>

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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  $c = -0.04 \text{ s}$*