

**NOVEMBER 2001**

**ADVANCED SUBSIDIARY LEVEL**

**MARK SCHEME**

**MAXIMUM MARK : 25**

**SYLLABUS/COMPONENT : 8702/3**

**PHYSICS  
(PRACTICAL)**



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## Measurements

<b>M1</b>	Measurements One mark for each set of readings Intervals must be correct or –1 Check values for $\frac{\sin \alpha}{\alpha}$ Values should be 0.0111; 0.0123; 0.0134; 0.0144; 0.0153; 0.0161	<b>6</b>
<b>M2</b>	Position of O Measure diameter and divide by 2 Allow folding of the card ideas	<b>1</b>
<b>M3</b>	Radius value with unit Accept 14.5 cm $\pm$ 0.2 cm	<b>1</b>
<b>M4</b>	% uncertainty in $r$ Accept 0.68%, 0.7%, 1% Working must be correct N/A 0.34% or 1.37%	<b>1</b>
<b>M5</b>	Value of $y$ Accept 6.3 cm $\pm$ 0.2 cm	<b>1</b>
<b>M6</b>	Quality of results Judge by scatter of points about the line of best fit A shallow curve gets $\frac{1}{2}$ 5 trend plots gets $\frac{1}{2}$	<b>2</b>

## Presentation of results

<b>R1</b>	Column headings Every column heading must have a quantity Expect to see $y/\text{cm}$ , but ignore degrees if missing N/A $\sin \alpha$ /degree	<b>1</b>
<b>R2</b>	Consistency of raw values of $y$ only Values must be given to the nearest millimetre	<b>1</b>
<b>R3</b>	SF in final value of $r$ Allow 2 or 3 sf only	<b>1</b>

## Graphical work

<b>G1</b>	Axes The plotted points must occupy at least half the graph grid in both the $x$ and $y$ directions. The axes must be labelled. Do not allow awkward scales.	<b>1</b>
<b>G2</b>	Plotting of points Check one suspect plot. Work to half a small square.	<b>1</b>
<b>G3</b>	Line of best fit At least 5 trend plots needed. Allow a straight line to be drawn through a shallow curved trend.	<b>1</b>

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- G4** Determination of gradient 1  
Check the read-offs and that  $\Delta y/\Delta x$  has been calculated.  
The length of the hypotenuse must be greater than half the length of the drawn line.

### Analysis of results

- A1** Gradient equated with  $\frac{120r}{\pi}$  1
- A2** Correct working for  $r$  1
- A3**  $r$  in range 14.0 cm to 15.2 cm 1
- A4** Unit of  $r$  correct 1  
Unit must be consistent with the value
- A5** Sensible comment relating to  $r$  value 2  
One mark for good agreement/same value/similar value/slightly different  
One mark for sensible comment as to why the values are similar/not the same;  
e.g. card is not a perfect circle, % uncertainty is small, theory is correct.  
Statement 'values are different' scores zero.  
Vague answers such as 'inaccuracies', 'errors' or 'graph drawing' are not to be credited.

### Special cases

- S1** Something very wrong;  
**M1, -2; M6 = 0 (and probably A3 = 0 also)**
- S2** Substitution method for  $r$ ;  
**A1 = A2 = 0**
- S3** Uses  $2\alpha$  instead of  $\alpha$ ; calculator in radian mode; subtraction method for  $\alpha$ ;  
**M1, -1; M6 = 0; A3 = 0**
- S4** POT error;  
**A3 = 0**