

# PHY 123 EXPERIMENT 6 Angular Momentum - Worksheet

## Measurement of the Moment of Inertia of the Rotating Platform and Attached Cylinder

Radius  $r$ : \_\_\_\_\_

$\Delta r$ : \_\_\_\_\_

Mass  $m$ : \_\_\_\_\_

$\Delta m$ : \_\_\_\_\_

Table 1:

Time $t$ [ ]	Angular Velocity $\omega$ [ ]

The angular acceleration due to friction,  $\alpha_{fr}$ , is :

\_\_\_\_\_ [ ]

Table 2:

Time $t$ [ ]	Angular Velocity $\omega$ [ ]

The angular acceleration with a 200g mass,  $\alpha$ , is:

\_\_\_\_\_ [ ]

Find  $I$ , the moment of inertia of the platform, and its error  $\Delta I$  (refer to equation (6.5), calculate the error following the instruction in the lab materials and show your working):

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Find the Moment of inertia of the dropped disk and it's error  $\left( I_{disk} = \frac{1}{2}MR^2 \right)$

$$M = \text{_____} [ \quad ] \quad \Delta M = \text{_____} [ \quad ]$$

$$R = \text{_____} [ \quad ] \quad \Delta R = \text{_____} [ \quad ]$$

$$I_{disk} = \text{_____} [ \quad ]$$

$$\Delta I_{disk} = \left( \sqrt{\left( \frac{\Delta M}{M} \right)^2 + \left( 2 \frac{\Delta R}{R} \right)^2} \right) \times I_{disk} = \text{_____} [ \quad ]$$

Find the Moment of inertia of the platform and disk combined, which is the final moment of inertia  $I'$

$$I' = \text{_____} [ \quad ]$$

$$\Delta I' = \sqrt{\Delta I^2 + \Delta I_{disk}^2} = \text{_____} [ \quad ]$$

**Conservation of Angular Momentum:**

Table 3:

$\omega$ [ rads/s ]
$\omega'$ [ rads/s ]

Find  $\omega \pm \Delta\omega$ , and  $\omega' \pm \Delta\omega'$  (show working):

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Now find the angular momentum before and after the drop:

$L =$  \_\_\_\_\_ [       ]

$\Delta L = \left( \sqrt{\left(\frac{\Delta I}{I}\right)^2 + \left(\frac{\Delta\omega}{\omega}\right)^2} \right) \times L =$  \_\_\_\_\_ [       ]

$L' =$  \_\_\_\_\_ [       ]

$\Delta L' = \left( \sqrt{\left(\frac{\Delta I'}{I'}\right)^2 + \left(\frac{\Delta\omega'}{\omega'}\right)^2} \right) \times L' =$  \_\_\_\_\_ [       ]

Is angular momentum conserved? \_\_\_\_\_