**Rotational Motion Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    Course:\_\_\_\_\_\_\_**

Demonstration on Rotational Inertia $I=\sum\_{}^{}mr^{2}$

Apparatus:

Observation:

Explanation:

Data Table A: g = 9.8 m/s2 $\%Difference=\frac{\left|Difference\right|}{Average}×100$

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Radial distance of masses, r (cm) |   | Acceleration, *a* (m/s2) | *I*  (g.cm2)$$I=113\left[\frac{g}{a}-1\right]$$ | *\*I*  (g.cm2) For 2 point masses |
| Pulley-Rod |   |   |
| 3 | Pulley-Rod + M’s at 3 cm  |   |   |  |
| 6 | Pulley-Rod + M’s at 6 cm  |  |   |  |
| 9 | Pulley-Rod + M’s at 9 cm  |   |   |  |
| 12 | Pulley-Rod + M’s at 12 cm  |  |   |  |
| 15 | Pulley-Rod + M’s at 15 cm  |  |  |  |
| 18 | Pulley-Rod + M’s at 18 cm  |  |  |  |

\**I*, For 2 point masses are obtained by subtracting the Pulley-Rod value from
the Pulley-Rod + M’s values.

Attach your Excel plots: Mass from plot = \_\_\_\_\_\_\_\_\_\_\_\_

 Mass from scale=\_\_\_\_\_\_\_\_\_\_\_\_%Difference \_\_\_\_\_\_\_

**DATA Table B:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | Acceleration, *a* (m/s2) | *I*, Exptal\*(g.cm2)$I=113\left[\frac{g}{a}-1\right]$  | *IT*, Theory\*\*(g.cm2) | % Difference |
| Pulley  |   |   | XXXXXXXXXXX | XXXXXXX |
| Pulley & Rod  |  |  | XXXXXXXXXXX | XXXXXXX |
| Rod | XXXXXXXX |  |  |  |
| Pulley & Disk  |   |   | XXXXXXXXXXX | XXXXXXX |
| Disk  | XXXXXXXX |   |   |  |
| Pulley, Disk & Ring |   |   | XXXXXXXXXXX | XXXXXXX |
| Ring  | XXXXXXXX |   |   |   |

\*\**IT* (rod) = (1/12)m*L2* \*\**IT* (disk) = 0.5 *MR2*;     \*\**IT* (Ring) = 0.5 *M1(R12 +R22 )*;
 \**I*, for the rod is obtained by subtracting the pulley value from the pulley & rod value.
\**I*, for the disk is obtained by subtracting the pulley value from the pulley & disk value.

Data for calculating *IT*:

Length of rod = L = \_\_\_\_\_\_\_\_\_\_\_\_\_ Mass of rod = m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Mass of the gray disk = *M* = \_\_\_\_\_\_\_\_\_\_ Mass of black ring = *M1* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
|  Dimensions of the ring & disk | Diameter (cm) | Radius (cm) |
| Inside of black ring |   | *R1*= |
| Outside of black ring |   | *R2*= |
| Gray disk |   | *R*  = |

**C. Purpose**: Investigate what happens to the angular momentum and rotational kinetic energy when a disk is dropped onto a rotating disk.
DATA C: (Include units)  

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trial | *ωi* | *ωf* | From Data Table B | *Li = Iiωi* | *Lf = Ifωf*  | % Difference |
| *I i*  | *I f*  |
| 1. |  |  |  |  |  |  |  |
| 2. |  |  |  |  |  |  |  |
| 3. |  |  |  |  |  |  |  |

 Calculation of initial and final rotational kinetic energies (in SI unit) for one trial:

Conclusion for the last activity, C: