	A	B	C	D	E	F	G	H	I	J	K	L
1	Your name	Date										
2	Partner's name											
3												
4	**Phys 1101/1120 - Surrey Campus**				**DISCLAIMER: These example data are purposefully**							
5	**Expt. 5: Moment of Inertia**				**inaccurate. You may test your spreadsheet equations**							
6					**for correctness using these values, but your real**							
7	**DATA**				**experimental values will be very different.**							
8												
9	**Dimensions of objects:**											
10	**Ring:**				**Bar:**				**Disk:**			
11	**M_r (g)**	**dM_r (g)**	**(dM/M)_r**		**M_b (g)**	**dM_b (g)**	**(dM/M)_b**		**M_d (g)**	**dM_d (g)**	**(dM/M)_d**	
12	**800**	**0.5**	0.06%		**840**	**0.5**	0.06%		**780**	**0.5**	0.06%	
13												
14	**Do_r (cm)**	**dDo_r (cm)**	**(dDo/Do)_r**		**L (cm)**	**dL (cm)**	**dL/L**		**D_d (cm)**	**dD_d (cm)**	**(dD/D)_d**	
15	**14**	**0.05**	0.36%		**20**	**0.05**	0.25%		**20**	**0.05**	0.25%	
16												
17	**Di_r (cm)**	**dDi_r (cm)**	**(dDi/Di)_r**		**W (cm)**	**dW (cm)**	**dW/W**					
18	**13**	**0.05**	0.38%		**7**	**0.05**	0.71%					
19												
20												
21	**CALCULATIONS:**											
22												
23	**Dimensions of objects:**											
24	**Ring:**				**Bar:**				**Disk:**			
25	**M_r (kg)**	**dM_r (kg)**	**(dM/M)_r**		**M_b (kg)**	**dM_b (kg)**	**(dM/M)_b**		**M_d (kg)**	**dM_d (kg)**	**(dM/M)_d**	
26	0.8	0.0005	0.06%		0.84	0.0005	0.06%		0.78	0.0005	0.06%	
27	Note: radius, not diameter!								Note: radius, not diameter!			
28	**Ro_r (m)**	**dRo_r (m)**	**(dRo/Ro)_r**		**L (m)**	**dL (m)**	**dL/L**		**R_d (m)**	**dR_d (m)**	**(dR/R)_d**	
29	0.07	0.00025	0.36%		0.2	0.0005	0.25%		0.1	0.00025	0.25%	
30												
31	**Ri_r (m)**	**dRi_r (m)**	**(dRi/Ri)_r**		**W (m)**	**dW (m)**	**dW/W**					
32	0.065	0.00025	0.38%		0.07	0.0005	0.71%					
33												
34	**Theoretical Moments of Inertia:**											
35	**Ring:**				**Bar:**				**Disk:**			
36	**I_r (kgm^2)**	**dI_r (kgm^2)**	**(dI/I)_r**		**I_b (kgm^2)**	**dI_b (kgm^2)**	**(dI/I)_b**		**I_d (kgm^2)**	**dI_d (kgm^2)**	**(dI/I)_d**	
37	0.00365	1.9241E-05	0.53%		0.003143	1.49503E-05	0.48%		0.0039	1.96596E-05	0.50%	
38												
39	**Sub-calculations for uncertainties of theoretical moments of inertia:**											
40	**Ring:**				**Bar:**				**Disk:**			
41	**d(Ro^2)**	0.000035			**d(L^2)**	0.0002			**d(R^2)**	0.00005		
42	**d(Ri^2)**	0.0000325			**d(W^2)**	0.00007			**d(R^2)/R^2**	0.005		
43	**d(Ro^2+Ri^2)**	4.7762E-05			**d(L^2+W^2)**	0.000211896						
44	**d(Ro^2+Ri^2) / (Ro^2+Ri^2)**				**d(L^2+W^2) / (L^2+W^2)**							
45		0.00523424				0.004719292						
46												
47												
48												

	M	N	O	P	Q	R	S	T	U	V	W
1											
2											
3											
4											
5											
6											
7											
8											
9	**Diameter of step pulley:**				**Hanging mass:**				**Acceleration due to g:**		
10	**d (mm)**	**δd (mm)**	**δd/d**		**mh (g)**	**dmh (g)**	**dmh/mh**		**g (m/s^2)**	**dg (m/s^2)**	**dg/g**
11	**40**	**0.03**	0.08%		**43**	**0.05**	0.12%		**9.81**	**0.01**	0.10%
12											
13	**Measured angular accelerations:**										
14	**Apparatus Only:**										
15	**α_a (rad/s)**	**dα_a (rad/s)**	**(dα/α)_a**								
16	**2**	0.04	2.00%								
17											
18	**Apparatus+Ring:**				**Apparatus + Bar:**				**Apparatus+Disk:**		
19	**α_a+r (rad/s)**	**dα_a+r (rad/s)**	**(dα/α)_a+r**		**α_b (rad/s)**	**dα_b (rad/s)**	**(dα/α)_b**		**α_d (rad/s)**	**dα_d (rad/s)**	**(dα/α)_d**
20	**1.09**	0.0218	2.00%		**1.14**	0.0228	2.00%		**1.04**	0.0208	2.00%
21											
22											
23	Note: radius, not diameter!										
24	**Radius of step pulley:**				**Hanging mass:**						
25	**r (m)**	**δr (m)**	**dr/r**		**mh (kg)**	**dmh (kg)**	**dmh/mh**				
26	0.02	0.000015	0.08%		0.043	0.00005	0.12%				
27											
28	**Experimental Moments of Inertia:**										
29	**Apparatus Only:**										
30	**I_a (kgm^2)**	**dI_a (kgm^2)**	**(dI/I)_a**								
31	0.0042011	8.46769E-05	2.02%								
32											
33	**Apparatus+Ring:**				**Apparatus+Bar:**				**Apparatus+Disk:**		
34	**I_a+r (kgm^2)**	**dI_a+r (kgm^2)**	**(dI/I)_a+r**		**I_a+b (kgm^2)**	**dI_a+b (kgm^2)**	**(dI/I)_a+b**		**I_a+d (kgm^2)**	**dI_a+d (kgm^2)**	**(dI/I)_a+d**
35	0.0077228	0.00015537	2.01%		0.007383326	0.000148556	2.01%		0.008094915	0.00016284	2.01%
36											
37	**Ring Only:**				**Bar Only:**				**Disk Only:**		
38	**I_r (kgm^2)**	**dI_r (kgm^2)**	**(dI/I)_r**		**I_b (kgm^2)**	**dI_b (kgm^2)**	**(dI/I)_b**		**I_d (kgm^2)**	**dI_d (kgm^2)**	**(dI/I)_d**
39	0.0035217	0.000176947	5.02%		0.003182226	0.000170994	5.37%		0.003893815	0.000183541	4.71%
40											
41	**Sub-calculations for experimental moments of inertia:**										
42	**d(mr^2)**	3.26441E-08									
43											
44	**mh*r*g/α**	**d(mh*r*g/α)**									
45	0.0042183	8.46769E-05									
46	0.00774	0.00015537									
47	0.007400526	0.000148556									
48	0.008112115	0.00016284									