	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 - Theoretical Values**				**experimental values will be very different.**							
8												
9	**Dimensions of object:**											
10	**M (g)**	**dM (g)**	**dM/M**									
11	**840**	**0.5**	0.06%									
12	Bar lying flat on its broadest surface:				Bar lying on long, skinny edge:				Bar lying on short, skinny edge:			
13	**Bar_flat:**				**Bar_longedge:**				**Bar_shortedge:**			
14	**L_f (cm)**	**dL_f (cm)**	**(dL/L)_f**		**L_l (cm)**	**dL_l (cm)**	**(dL/L)_l**		**L_s (cm)**	**dL_s (cm)**	**(dL/L)_s**	
15	**25**	**0.05**	0.20%		**25**	**0.05**	0.20%		**7**	**0.05**	0.71%	
16												
17	**W_f (cm)**	**dW_f (cm)**	**(dW/W)_f**		**W_l (cm)**	**dW_l (cm)**	**(dW/W)_l**		**W_s (cm)**	**dW_s (cm)**	**(dW/W)_s**	
18	**7**	**0.05**	0.71%		**3**	**0.05**	1.67%		**3**	**0.05**	1.67%	
19												
20												
21	**CALCULATIONS - Theoretical Values**											
22												
23	**Dimensions of object:**											
24	**M (kg)**	**dM (kg)**	**dM/M**									
25	0.84	0.0005	0.06%									
26	Bar lying flat on its broadest surface:				Bar lying on long, skinny edge:				Bar lying on short, skinny edge:			
27	**Bar_flat:**				**Bar_longedge:**				**Bar_shortedge:**			
28	**L_f (m)**	**dL_f (m)**	**(dL/L)_f**		**L_l (m)**	**dL_l (m)**	**(dL/L)_l**		**L_s (m)**	**dL_s (m)**	**(dL/L)_s**	
29	0.25	0.0005	0.20%		0.25	0.0005	0.20%		0.07	0.0005	0.71%	
30												
31	**W_f (m)**	**dW_f (m)**	**(dW/W)_f**		**W_l (m)**	**dW_l (m)**	**(dW/W)_l**		**W_s (m)**	**dW_s (m)**	**(dW/W)_s**	
32	0.07	0.0005	0.71%		0.03	0.0005	1.67%		0.03	0.0005	1.67%	
33												
34												
35	**Theoretical Moments of Inertia:**											
36	Bar lying flat on its broadest surface:				Bar lying on long, skinny edge:				Bar lying on short, skinny edge:			
37	**Bar_flat:**				**Bar_longedge:**				**Bar_shortedge:**			
38	**I_f (kgm^2)**	**dI_f (kgm^2)**	**(dI/I)_f**		**I_l (kgm^2)**	**dI_l (kgm^2)**	**(dI/I)_l**		**I_s (kgm^2)**	**dI_s (kgm^2)**	**(dI/I)_s**	
39	0.004718	1.8389E-05	0.39%		0.004438	1.7822E-05	0.40%		0.000406	5.33652E-06	1.31%	
40												
41	**Sub-calculations for uncertainties of theoretical moments of inertia:**											
42	Bar lying flat on its broadest surface:				Bar lying on long, skinny edge:				Bar lying on short, skinny edge:			
43	**Bar_flat:**				**Bar_longedge:**				**Bar_shortedge:**			
44	**d(L^2)**	0.00025			**d(L^2)**	0.00025			**d(L^2)**	0.00007		
45	**d(W^2)**	0.00007			**d(W^2)**	0.00003			**d(W^2)**	0.00003		
46	**d(L^2+W^2)**	0.00025962			**d(L^2+W^2)**	0.00025179			**d(L^2+W^2)**	7.61577E-05		
47	**d(L^2+W^2)/(L^2+W^2)**				**d(L^2+W^2)/(L^2+W^2)**				**d(L^2+W^2)/(L^2+W^2)**			
48		0.00385186				0.00397151				0.013130643		
49												

	M	N	O	P	Q	R	S	T	U	V	W
1											
2											
3											
4											
5											
6	**DATA - Experimental Values**										
7											
8	**Diameter of step pulley:**				**Hanging mass:**				**Acceleration due to g:**		
9	**d (mm)**	**δd (mm)**	**δd/d**		**mh (g)**	**dmh (g)**	**dmh/mh**		**g (m/s^2)**	**dg (m/s^2)**	**dg/g**
10	**40**	**0.03**	0.08%		**43**	**0.05**	0.12%		**9.81**	**0.01**	0.10%
11											
12	**Measured angular accelerations:**										
13	**Apparatus Only:**										
14	**α_a (rad/s^2)**	**dα_a (rad/s^2)**	**(dα/α)_a**								
15	**2**	0.04	2.00%								
16											
17	**Apparatus+Bar_flat:**				**Apparatus+Bar_longedge:**				**Apparatus+Bar_shortedge:**		
18	**α_f (rad/s^2)**	**dα_f (rad/s^2)**	**(dα/α)_f**		**α_l (rad/s^2)**	**dα_l (rad/s^2)**	**(dα/α)_l**		**α_s (rad/s^2)**	**dα_s (rad/s^2)**	**(dα/α)_s**
19	**0.95**	0.019	2.00%		**0.98**	0.0196	2.00%		**1.02**	0.0204	2.00%
20											
21	**CALCULATIONS - Experimental Values**										
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	Bar lying flat on its broadest surface:				Bar lying on long, skinny edge:				Bar lying on short, skinny edge:		
33	**Apparatus+Bar_flat:**				**Apparatus+Bar_longedge:**				**Apparatus+Bar_shortedge:**		
34	**I_a+f (kgm^2)**	**dI_a+f (kgm^2)**	**(dI/I)_a+f**		**I_a+l (kgm^2)**	**dI_a+l (kgm^2)**	**(dI/I)_a+l**		**I_a+s (kgm^2)**	**dI_a+s (kgm^2)**	**(dI/I)_a+s**
35	0.008863432	0.000178267	2.01%		0.008591576	0.00017281	2.01%		0.008253976	0.000166033	2.01%
36											
37	Bar lying flat on its broadest surface:				Bar lying on long, skinny edge:				Bar lying on short, skinny edge:		
38	**Bar_flat Only:**				**Bar_longedge Only:**				**Bar_shortedge Only:**		
39	**I_f (kgm^2)**	**dI_f (kgm^2)**	**(dI/I)_f**		**I_l (kgm^2)**	**dI_l (kgm^2)**	**(dI/I)_l**		**I_s (kgm^2)**	**dI_s (kgm^2)**	**(dI/I)_s**
40	0.004662332	0.000197356	4.23%		0.004390476	0.000192441	4.38%		0.004052876	0.000186379	4.60%
41											
42	**Sub-calculations for experimental moments of inertia:**										
43	**d(mr^2)**	3.26441E-08									
44											
45		**mh*r*g/α**	**d(mh*r*g/α)**								
46	**Apparatus only:**	0.0042183	8.47E-05								
47	**App+Bar_flat:**	0.008880632	0.000178								
48	**App+Bar_longedge:**	0.008608776	0.000173								
49	**App+Bar_shortedge:**	0.008271176	0.000166								