	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Your name		Date												
2	Partner's name														
3															
4	**Phys 1101/1120 - Richmond campus**			**DISCLAIMER: These example data are purposefully**											
5	**Expt. 12: Leaning Ladder**			**inaccurate. You may test your spreadsheet equations**											
6				**for correctness using these values, but your real**											
7				**experimental values will be very different.**											
8	**DATA**														
9															
10	**Mass of barbell:**					**Acceleration due to gravity:**									
11	**m (g)**	**dm (g)**	**dm/m**			**g (m/s^2)**	**dg (m/s^2)**	**dg/g**							
12	**450**	**0.05**	0.01%			**9.81**	**0.01**	0.10%							
13															
14	**Maximum force due to static friction:**														
15	**Ffs (N)**	**dFfs (N)**	**dFfs/Ffs**												
16	**0.9**	**0.01**	1.11%												
17															
18	**Force due to kinetic friction:**														
19	**Ffk (N)**	**dFfk (N)**	**dFfk/Ffk**												
20	**0.7**	**0.01**	1.43%												
21															
22	**CALCULATIONS**														
23															
24	**Mass of barbell:**					**Critical angle of ladder, θ:**				**Note:**					
25	**m (kg)**	**dm (kg)**	**dm/m**			**Theta (rad)**	**dTheta (rad)**	**dTheta/Theta**		The Excel formula to calculate an inverse tangent is:					
26	0.45	0.00005	0.01%			1.18362922	0.003884862	0.33%			ATAN(value)				
27										The uncertainty of inverse tangent is					
28	**Coefficient of static friction, μs:**					**Critical angle of ladder, θ:**					$\delta\{Tan^{-1}(x)\} = \delta x/(1+x^2)$.				
29	**mu_s**	**dmu_s**	**(dmu/mu)_s**			**Theta (deg)**	**dTheta (deg)**	**dTheta/Theta**		Excel's output from ATAN(value) will be in units of radians.					
30	0.2038736	0.002265	1.11%			67.8169591	0.222586217	0.33%							
31															
32	**Coefficient of kinetic friction, μk:**					**Subcalculations for critical angle of ladder:**									
33	**mu_k**	**dmu_k**	**(dmu/mu)_k**			**1/(2*mu)**	2.4525								
34	0.15856835	0.002265	1.43%			**d(1/(2*mu))**	0.027251362								