

	A	B	C	D	E	F	G
1	Phys 1102/1220 - Richmond Campus				DISCLAIMER: These example data are purposefully		
2	Experiment 3: Grating Spectrometer				inaccurate. You may test your spreadsheet equations		
3	Your name, Partner's Name				for correctness using these values, but your real		
4	Date				experimental values will be very different.		
5							
6	Finding the grating spacing 'd'						
7	DATA						
8	Central Image Angular Position						
9	θ_C (deg)	$\delta\theta_C$ (deg)	$\delta\theta/\theta_C$				
10	65.1	0.02	0.03%				
11							
12	Wavelength	Right Angular Position			Left Angular Position		
13	λ (nm)	θ_R (deg)	$\delta\theta_R$ (deg)	$\delta\theta/\theta_R$	θ_L (deg)	$\delta\theta_L$ (deg)	$\delta\theta/\theta_L$
14	447.1	52.2	0.02	0.04%	78	0.02	0.03%
15	471.3	51.5	0.02	0.04%	78.7	0.02	0.03%
16	492.3	50.9	0.02	0.04%	79.4	0.02	0.03%
17	501.6	50.6	0.02	0.04%	79.6	0.02	0.03%
18	587.6	48.1	0.02	0.04%	82.2	0.02	0.02%
19	667.8	45.7	0.02	0.04%	84.6	0.02	0.02%
20							
21	CALCULATIONS						
22	Wavelength	1st order (n=1) diffraction angle			1st order (n=-1) diffraction angle		
23	λ (nm)	θ_1 (deg)	$\delta\theta_1$ (deg)	$\delta\theta/\theta_1$	$\theta_{[-1]}$ (deg)	$\theta_{[-1]}$ (deg)	$\delta\theta/\theta_{[-1]}$
24	447.1	12.9	0.028284271	0.22%	12.9	0.028284271	0.22%
25	471.3	13.6	0.028284271	0.21%	13.6	0.028284271	0.21%
26	492.3	14.2	0.028284271	0.20%	14.3	0.028284271	0.20%
27	501.6	14.5	0.028284271	0.20%	14.5	0.028284271	0.20%
28	587.6	17	0.028284271	0.17%	17.1	0.028284271	0.17%
29	667.8	19.4	0.028284271	0.15%	19.5	0.028284271	0.15%
30							
31	Wavelength	Average 1st order Diffraction Angle			Diffraction grating spacing		
32	λ (nm)	θ_{1_avg} (deg)	$\delta\theta_{1_avg}$ (deg)	$\delta\theta/\theta_{1_avg}$	d (nm)	δd (nm)	$\delta d/d$
33	447.1	12.9	0.02	0.16%	2002.686529	3.05229762	0.15%
34	471.3	13.6	0.02	0.15%	2004.319829	2.891963512	0.14%
35	492.3	14.25	0.02	0.14%	1999.973244	2.748863373	0.14%
36	501.6	14.5	0.02	0.14%	2003.354868	2.704003181	0.13%
37	587.6	17.05	0.02	0.12%	2004.050893	2.28098975	0.11%
38	667.8	19.45	0.02	0.10%	2005.501029	1.982381796	0.10%
39							
40	Average grating spacing						
41	d_avg (nm)	δd_{avg} (nm)	$\delta d/d_{avg}$				
42	2003.314399	1.54461814	0.08%				
43							
44	SUB-CALCS IN RADIANs			UNCERT SUB-CALCS			
45	θ_{1_avg} (rad)	$\delta\theta_{1_avg}$ (rad)		$\partial d/\partial\theta$			
46	0.225147474	0.000349066		-8744.188571			
47	0.237364778	0.000349066		-8284.865187			
48	0.248709418	0.000349066		-7874.913485			
49	0.253072742	0.000349066		-7746.398502			
50	0.297578637	0.000349066		-6534.554289			
51	0.33946654	0.000349066		-5679.105515			

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4	Date				experimental values will be very different.		
5							
6	Spectrum of Unknown Gas						
7	DATA						
8	Grating Spacing, from Part A				Central Image Angular Position		
9	d (nm)	δd (nm)	$\delta d/d$		θ_C (deg)	$\delta\theta_C$ (deg)	$\delta\theta/\theta_C$
10	2003.314399	1.54461814	0.08%		65.1	0.02	0.03%
11							
12	Spec. lines	Right Angular Position			Left Angular Position		
13	of unknown	θ_R (deg)	$\delta\theta_R$ (deg)	$\delta\theta/\theta_R$	θ_L (deg)	$\delta\theta_L$ (deg)	$\delta\theta/\theta_L$
14	colour 1	53.5	0.02	0.04%	76.8	0.02	0.03%
15	colour 2	52.6	0.02	0.04%	77.7	0.02	0.03%
16	colour 3	49.3	0.02	0.04%	80.9	0.02	0.02%
17	colour 4	48.3	0.02	0.04%	81.9	0.02	0.02%
18							
19	CALCULATIONS						
20	Spec. lines	1st order (n=1) diffraction angle			1st order (n=-1) diffraction angle		
21	of unknown	θ_1 (deg)	$\delta\theta_1$ (deg)	$\delta\theta/\theta_1$	$\theta_{[-1]}$ (deg)	$\theta_{[-1]}$ (deg)	$\delta\theta/\theta_{[-1]}$
22	colour 1	11.6	0.028284271	0.24%	11.7	0.028284271	0.24%
23	colour 2	12.5	0.028284271	0.23%	12.6	0.028284271	0.22%
24	colour 3	15.8	0.028284271	0.18%	15.8	0.028284271	0.18%
25	colour 4	16.8	0.028284271	0.17%	16.8	0.028284271	0.17%
26							
27	Spec. lines	Average 1st order Diffraction Angle			Wavelength		
28	of unknown	θ_{1_avg} (deg)	$\delta\theta_{1_avg}$ (deg)	$\delta\theta/\theta_{1_avg}$	λ (nm)	$\delta\lambda$ (nm)	$\delta\lambda/\lambda$
29	colour 1	11.65	0.02	0.17%	404.5346557	0.752563429	0.19%
30	colour 2	12.55	0.02	0.16%	435.3032115	0.760634653	0.17%
31	colour 3	15.8	0.02	0.13%	545.4629394	0.793492151	0.15%
32	colour 4	16.8	0.02	0.12%	579.0215605	0.804652406	0.14%
33							
34	SUB-CALCS IN RADIANS				UNCERT SUB-CALCS		
35	θ_{1_avg} (rad)	$\delta\theta_{1_avg}$ (rad)	$\delta\theta/\theta_{1_avg}$		$\partial\lambda/\partial d$	$\partial\lambda/\partial\theta$	
36	0.203330858	0.000349066	0.17%		0.201932685	1962.044926	
37	0.219038821	0.000349066	0.16%		0.21729151	1955.44872	
38	0.275762022	0.000349066	0.13%		0.272280247	1927.625161	
39	0.293215314	0.000349066	0.12%		0.289031797	1917.811934	