

	A	B	C	D	E	F	G
1	Phys 1102/1220 - Richmond Campus			DISCLAIMER: These example data are purposefully inaccurate. You may test your spreadsheet equations for correctness using these values, but your real experimental values will be very different.			
2	Experiment 10: Oscilloscope and RC Time Constant						
3	Your name, Partner's Name						
4	Date						
5							
6	Part C: Slow Capacitor Discharge						
7	<u>DATA</u>						
8	Measured Resistance			Measured Capacitance			
9	R (kΩ)	ΔR (kΩ)	ΔR/R		C (μF)	ΔC (μF)	ΔC/C
10	20	0.02	0.1%		550	11	2.0%
11							
12	Half time from scope trace						
13	T _[1/2] (s)	ΔT _[1/2] (s)	ΔT _[1/2] /T _[1/2]				
14	7.7	0.385	5.0%				
15							
16	Data from scope trace						
17	Elapsed time			Voltage across capacitor			
18	t (s)	Δt (s)	Δt/t	VC (V)	ΔVC (V)	ΔVC/VC	
19	0	0	5.0%	12.2	0.61	5.0%	
20	2	0.1	5.0%	10.1	0.505	5.0%	
21	4	0.2	5.0%	8.7	0.435	5.0%	
22	6	0.3	5.0%	7.22	0.361	5.0%	
23	8	0.4	5.0%	5.85	0.2925	5.0%	
24	10	0.5	5.0%	4.91	0.2455	5.0%	
25	12	0.6	5.0%	4.13	0.2065	5.0%	
26	14	0.7	5.0%	3.5	0.175	5.0%	
27							
28	<u>CALCULATIONS</u>						
29	Theoretical time constant			Time constant calculated from T _[1/2]			
30	τ (s)	Δτ (s)	Δτ/τ		τ (s)	Δτ (s)	Δτ/τ
31	11	0.220274828	2.0%		11.10875181	0.555437591	5.0%
32							
33	Calculations for linear graph						
34	ln(VC/VC _{max})	Δln(VC/VC _{max})	Δln(VC/VC _{max})/ln(VC/VC _{max})				
35	0	0.070710678	#DIV/0!				
36	-0.188900528	0.070710678	37.4%				
37	-0.338112926	0.070710678	20.9%				
38	-0.524580999	0.070710678	13.5%				
39	-0.73499429	0.070710678	9.6%				
40	-0.91016201	0.070710678	7.8%				
41	-1.083158545	0.070710678	6.5%				
42	-1.248672983	0.070710678	5.7%				
43							
44	Slope of linear graph, from Linegraph V2			Time constant calculated from slope			
45	m (s ⁻¹)	Δm (s ⁻¹)	Δm/m		τ (s)	Δτ (s)	Δτ/τ
46	-0.090110485	0.010633185	11.8%		11.09748769	1.309521704	11.8%
47							
48	<u>UNCERT SUB-CALCS</u>						
49	∂τ/∂R	∂τ/∂C	∂ln(VC/VC _{max})/∂VC	∂ln(VC/VC _{max})/∂VC _{max}	∂τ/∂m		
50	0.00055	20000	0.081967213	0.081967213	123.154233		
51			0.099009901				
52			0.114942529				
53			0.138504155				
54			0.170940171				
55			0.203665988				
56			0.242130751				
57			0.285714286				

	A	B	C	D	E	F	G
1	Phys 1102/1220 - Richmond Campus				DISCLAIMER: These example data are purposefully inaccurate. You may test your spreadsheet equations for correctness using these values, but your real experimental values will be very different.		
2	Experiment 10: Oscilloscope and RC Time Constant						
3	<i>Your nam, Partner's Name</i>						
4	<i>Date</i>						
5							
6	Part D: Fast Capacitor Discharge						
7	DATA						
8	Measured Resistance				Measured Capacitance		
9	R (kΩ)	δR (Ω)	δR/R		C (μF)	δC (μF)	δC/C
10	20	0.02	0.1%		0.4	0.008	2.0%
11							
12	Half-time from scope trace						
13	VC_max (V)	T_[1/2] (ms)	δT_[1/2] (ms)	δT_[1/2]/T_[1/2]			
14	12	5.5	0.275	5.0%			
15	10	5.6	0.28	5.0%			
16							
17	CALCULATIONS						
18							
19	Theoretical time constant						
20	τ (ms)	δτ (ms)	δτ/τ				
21	8	0.160199875	2.0%				
22							
23	Time constants calculated from T_[1/2]						
24	VC_max (V)	τ (ms)	δτ (ms)	δτ/τ			
25	12	7.934822725	0.396741136	5.0%			
26	10	8.079092229	0.403954611	5.0%			
27							
28	UNCERT SUB-CALCS						
29	∂τ/∂R	∂τ/∂C					
30	0.0000004	20000					