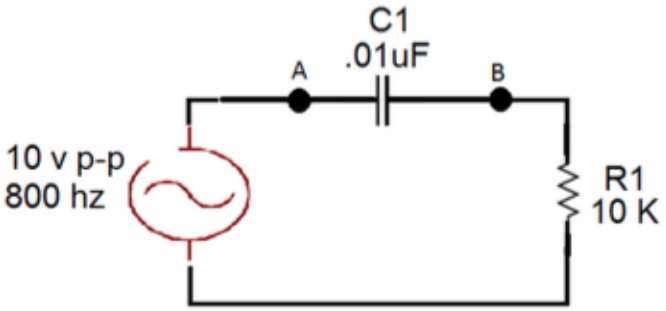
Basic Electricity – Unit 13: Capacitors and AC

Lab 1

1. Set up a signal generator for 10 V p-p @ 800 hz.



2.
3. Connect the signal generator to your test circuit.
4. Set up the oscilloscope so that both channel 1 and channel 2 grounds are set to zero in the center of the display.
5. Place the channel 1 oscilloscope probe at test point A. This will measure the input voltage (source voltage or total voltage).
6. Place the channel 2 oscilloscope probe at test point B. thiswill measure the output voltage (voltage across the resistor).
7. Place the signal generator ground (black) to the circuit ground.
8. Place the oscilloscope ground at the circuit ground.
9. Be sure your signal generator is in the sine wave mode.
10. Observe both channel 1 and channel 2 on the oscilloscope.
11. When observing both channels draw what you see on the oscilloscope screen below.

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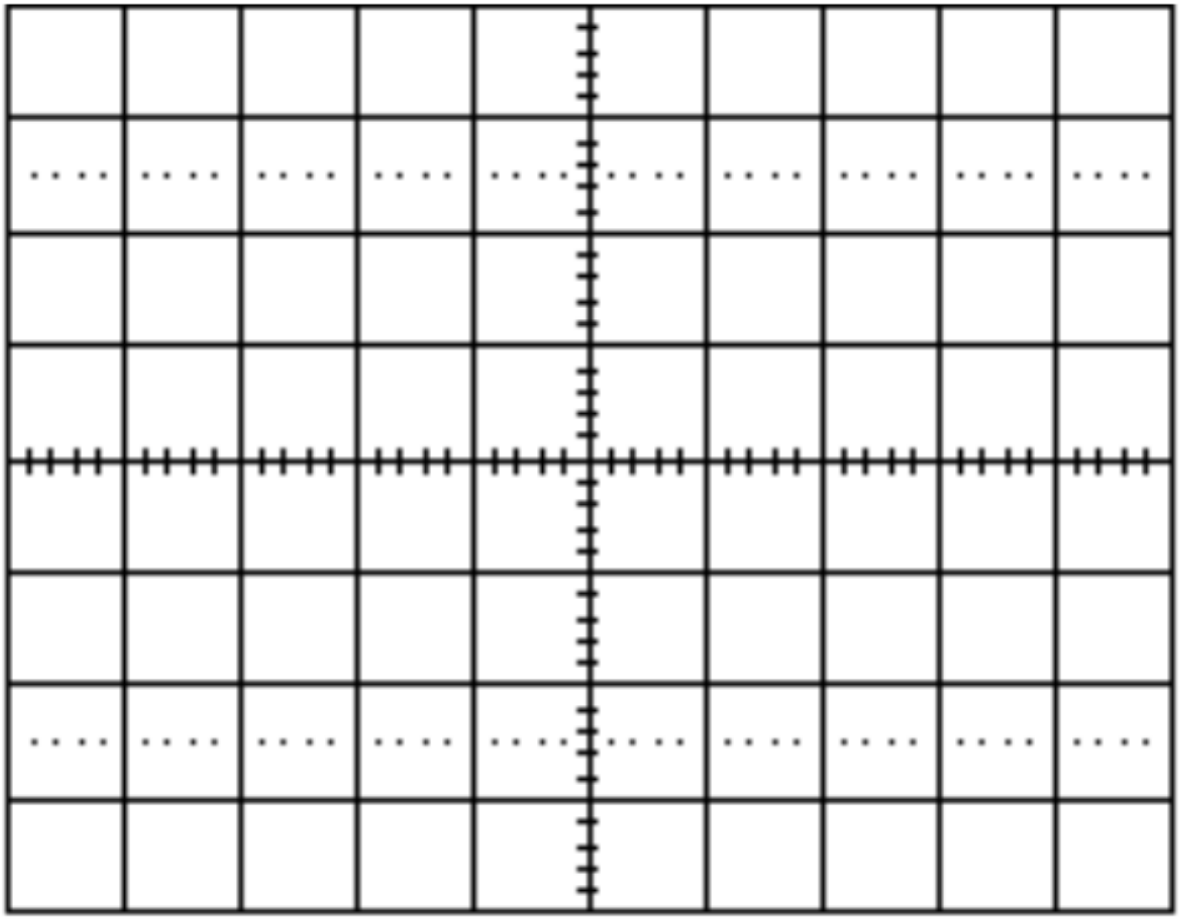

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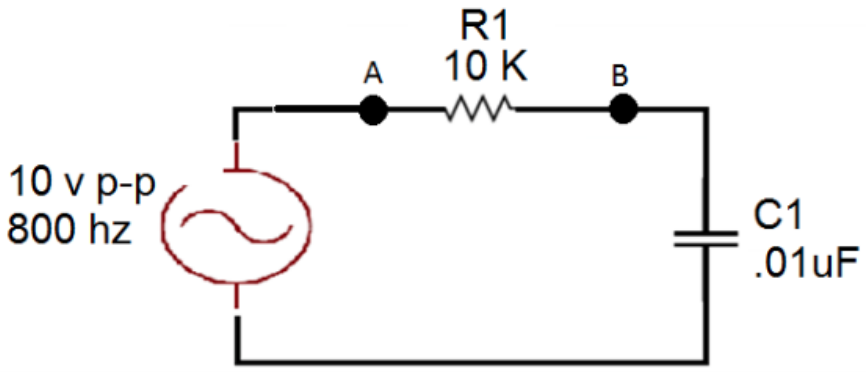
Lab 1

12. Calculate the phase shift.

$$\text{Phase Shift} = \frac{\text{time difference between waves}}{\text{time of one complete wave}} \times 360^{\circ}$$

Phase Shift = _____

Low Pass filters.



1. Construct the circuit.
2. Connect channel 1 of the oscilloscope to point B.
3. Adjust the output of the signal generator to 10 v p-p @ 100 hz. (Across the capacitor).
4. Adjust and record your values of frequency and voltage as shown in the table.
5. Plot on the graph paper provided.
6. Use excel to reproduce your data table and graph the results (Output voltage vs. Frequency).
7. Show the cutoff frequency on your graph.
8. Explain on your Excel sheet why this is a high pass filter.

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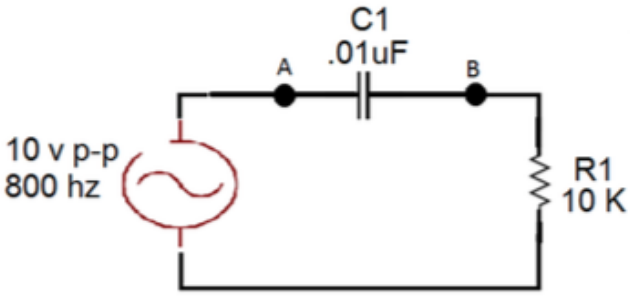
High Pass filters



9. Construct the circuit.
10. Connect channel 1 of the oscilloscope to point B.
11. Adjust the output of the signal generator to 10 v p-p @ 20000 hz. (Across the resistor).
12. Adjust and record your values of frequency and voltage as shown in the table.
13. Plot on the graph paper provided.
14. Use excel to reproduce your data table and graph the results(Output voltage vs. Frequency)..
15. Show the cutoff frequency on your graph.
16. Explain on your Excel sheet why this is a high pass filter.

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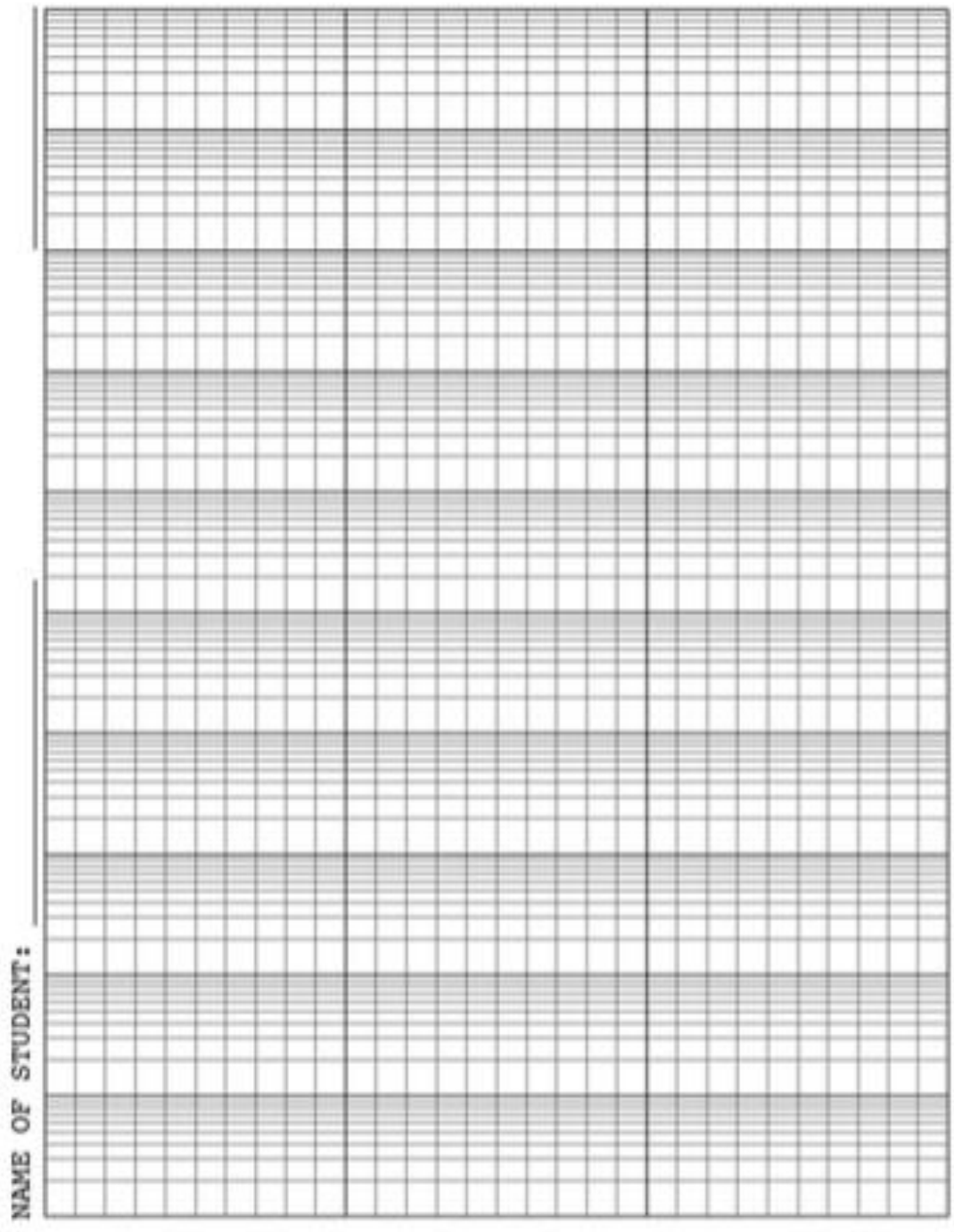
Low pass filter	
Frequency	Capacitor Voltage
100	
200	
300	
400	
500	
600	
700	
800	
900	
1000	
1500	
1800	
2100	
2400	
2700	
3000	
4000	
5000	
10000	

High Pass filter	
Frequency	Resistor Voltage
100	
150	
200	
250	
300	
400	
500	
600	
700	
800	
900	
1000	
1200	
1500	
2000	
3000	
4000	
5000	
10000	

Basic Electricity – Unit 13: Capacitors and AC

Lab 1



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Lab 1

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