Part I – Simple Circuit

1. Create a circuit with one battery, one light bulb, and one ammeter. Select the voltmeter too as you will be using it.
2. The default battery is 9 V. Record the current in the circuit by reading the ammeter.
3. Right-click on the battery and select "change voltage". Make the voltage 12 V. Record the current.
4. Repeat step 3 by increasing the voltage by 3 Volts until you fill in the data for Table 1.

Battery Voltage (volts)	Current (amps)	Battery Voltage ÷ Current
9 V		
12 V		
15 V		
18 V		
21 V		

Table 1 – One light bulb; a simple circuit.

Part II – Two Lights in Series

1. Insert another light bulb in series with the setup from Part I.
2. Set the battery to the voltages listed in Table 2 and record the current and voltage drop for each light bulb.

Battery Voltage (volts)	Current (amps)	Battery Voltage ÷ Current	Voltage Drop #1	Voltage Drop #2
9 V				
12 V				
15 V				
18 V				
21 V				

Table 2 – Two light bulbs in series

Part III – Three Lights in Series

1. Insert a third light bulb in series with the setup described above.
2. Set the battery to the voltages listed in Table 3 and record the voltage for each light bulb.

Battery Voltage (volts)	Current (amps)	Battery Voltage ÷ Current	Voltage Drop #1	Voltage Drop #2	Voltage Drop #3
9 V					
12 V					
15 V					
18 V					
21 V					

Table 3 – Three light bulbs in series

Part IV – Two Lights in Parallel

1. Create a circuit with a battery, two lights in parallel, and three ammeters (one ammeter to record the current going through each bulb and one to record the current coming out of the battery). Select the voltmeter as well.
2. Fill out the data for Table 4.

Battery Voltage (volts)	Current from Battery (amps)	Battery Voltage ÷ Battery Current	Current #1	Current #2	Battery Voltage ÷ Current #1
9 V					
12 V					
15 V					
18 V					
21 V					

Table 4 – Two lights in parallel.

Part V – Three Lights in Parallel

1. Insert a third light that is parallel with the circuit above and an ammeter to measure its current.
2. Fill out the data table below:

Battery Voltage (volts)	Current from Battery (amps)	Battery Voltage ÷ Battery Current	Current #1	Current #2	Current #3	Battery Voltage ÷ Current #1
9 V						
12 V						
15 V						
18 V						
21 V						

Table 5 – Three lights in parallel.

Part VI – Two lights in Parallel and in Series to a Third

1. Create the following circuit with the computer program:
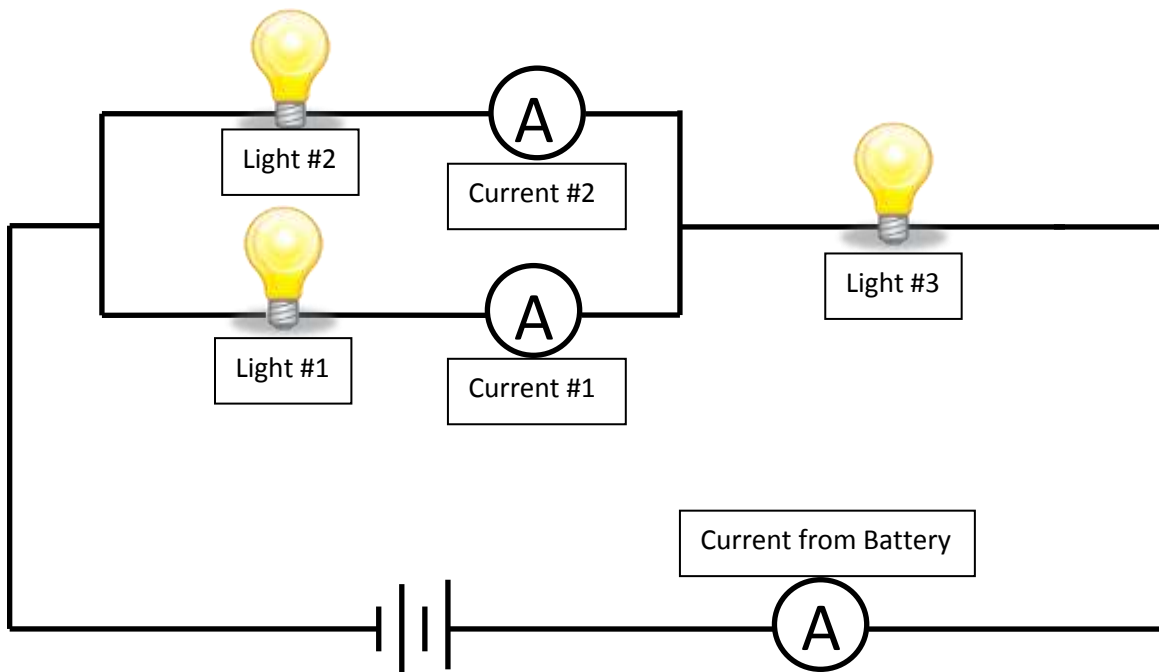
2. Fill out the data for the table below:

Battery Voltage (volts)	Current from Battery (amps)	Battery Voltage ÷ Battery Current	Current #1	Current #2	Voltage Drop #1	Voltage Drop #2	Voltage Drop #3	Voltage Drop #1 ÷ Current #1
9 V								
12 V								
15 V								
18 V								
21 V								

Table 6 – Combining parallel and series circuits.

Questions

1. For the lights in series, what do the voltage drops add up to?

2. For the lights in series, what did you notice about the battery voltage divided by the current?

3. For the lights in parallel, what do the individual currents add up to?

4. The overall resistance in a circuit is calculated by dividing the battery voltage by the current coming from the battery. If you have two resistors (light bulbs) should they be connected in series or parallel to have the lowest possible resistance?

5. For the circuit in Part VI, what is the voltage drop across each light divided by the current going through each light?