Properties of Series Circuits – Answer Key

Number of Resistors Connected	Current in the Circuit I (A)	Potential Difference V			
		Across the source	Across each Resistor		
			#1	#2	#3
1	0.1 A	2.7 Volts	2.7 Volts		
2	0.075 A	2.7 Volts	1.35 Volts	1.35 Volts	
3	0.05 A	2.7 Volts	0.9 Volts	0.9 Volts	0.9 Volts

1) As more light bulbs are connected in series with the first, what happens to

a) the current in the circuit? **The current in the circuit decreases.**

b) the potential difference across each resistor? **The potential difference across each resistor decreases.**

2) What is the relationship between the potential difference across the three resistors in series and the potential difference across the batteries? **The potential difference across each resistor adds up to the potential difference across the batteries (source).**

3) What happens to the brightness of each bulb as you make additions? **The brightness of each bulb decreases.**

4) Write a word equation showing the relationship between the current leaving the source and the current through each resistor. **The current through the source = current through resistor 1 = current through resistor 2 = current through resistor 3.**

5) Write a word equation showing the relationship between the potential difference across the source, and the potential difference across the resistor. **The potential difference across the source = the potential difference across resistor 1 + potential difference across resistor 2 + ……………..**

Properties of Parallel Circuits

Resistor Number in Parallel	Current, I, through Resistor	Potential difference across , V, across resistor
1	**0.1 Amps**	**2.7 Volts**
2	**0.1 Amps**	**2.7 Volts**
3	**0.1 Amps**	**2.7 Volts**

Number of Resistors	Current, I, through Source
1	**0.1 Amps**
2	**0.2 Amps**
3	**0.28 Amps**

1) What happens to the current through the source as current is allowed to pass through one, then two, and finally three resistors that are connected in parallel?
As current is allowed to pass through each additional resistor (light bulbs), the total current through the source increases.

2) What relationship can you find between the current through individual light bulbs in a parallel circuit and the current that passes through all the light bulbs?
The current through each resistor adds up to the current passing through the source (battery).

3) Compare the potential difference across the individual light bulbs and across the source in a parallel circuit. What do you notice about these values?

The potential difference across each light bulb is the same as the potential difference across the batteries.

4) Write a word equation showing the relationship between the current through the battery and sum of the currents in the branches. **Current through the batteries = current through light bulb # 1 + current through light bulb # 2 + current through light bulb # 3.**

5) Provide an explanation for the relationship between the potential differences across the individual light bulbs and across the battery in a parallel circuit.

Since the current has a direct path back to the source without passing through any other load, the potential difference across each load is the same.