

1.3 - Parallel Circuits

About parallel circuits

Parallel circuits provide a way to connect individual components to a common source while isolating each component from the effects of the others. Parallel circuits work great in house wiring and Christmas lights, since one burned-out bulb won't cause all of the other lights to go dark! Parallel wiring is most often used in distributing current to all of the individual components in a system.

Parallel circuit activity

1. Draw a schematic diagram showing two resistors connected in parallel to a 6 V power supply. Use any two different values of resistors from your kit of parts.

2. Build the circuit that you drew, above, on a breadboard. Do not connect the power supply yet.
3. Measure the resistance of each resistor. (Are they the same? Did you forget to isolate them?)

$$R_1 =$$

$$R_2 =$$

4. Using a calculator, **calculate** the total parallel resistance.

$$R_T =$$

5. Set a power supply to 6 V. Measure the potential of the power supply.

$$V_T =$$

6. Connect the power supply to the circuit and measure the potential drop across each resistor.

$$V_{R1} =$$

$$V_{R2} =$$

7. **Calculate** the total current flow (using the measured potential and resistances).

$$I_T =$$

8. Isolate each resistor, and measure the current flow through each.

$$I_{R1} =$$

$$I_{R2} =$$

9. Did your measured currents in step 8 equal your calculated current in step 7?

10. Using the measured potential and currents, calculate the total resistance. Is the resistance derived from this calculation the same as the resistance calculated in step 4?

$$R_T =$$

11. Identify which resistor conducted the most current. Was it the smaller one, or the larger one? Explain why.

Teacher Check

Parallel circuit analysis

12. Draw a schematic diagram showing three resistors connected in parallel to a 10 V source. Again, use any three resistor values from your kit of parts.

13. **Predict** how the circuit will behave.

a) Which resistor will have the highest current flow?

b) Which resistor will have the lowest current flow?

14. Calculate the following parameters for the parallel circuit.

$$R_T =$$

$$I_T =$$

$$I_{R1} =$$

$$I_{R2} =$$

$$I_{R3} =$$