

1.2 - Parallel Circuits

About parallel circuits

Parallel circuits provide a way to connect individual circuits or components to a common source while isolating each from the effects of the others. This works great in house wiring and Christmas lights, so that one burned out bulb won't cause all of the other lights to go dark! In electronics, parallel wiring most often is used only in distributing current to all of the individual circuit parts.

Parallel circuit activity

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

2. Build the circuit that you drew, above, on a breadboard.

3. Measure the resistance of each resistor. (Are they the same? Did you 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.

$E_T =$

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

$E_{R1} =$

$E_{R2} =$

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 CHRP 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.

$$R_T =$$

$$I_T =$$

$$I_{R1} =$$

$$I_{R2} =$$

$$I_{R3} =$$