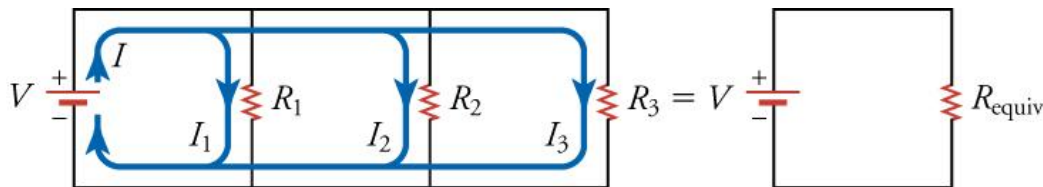


Parallel Wiring

- Same _____ across _____ devices
- Break in _____ has no effect on _____



- Resistors divide _____
- Each branch draws _____ as if the other _____ there
- Each branch draws _____ current than the _____ gives
 - $R = \frac{V}{I}$: Overall circuit: Large $I \rightarrow$ Small R
 - Smaller _____ than either _____

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

A 1004 Ω resistor and a 101 Ω resistor are connected in parallel. What is the equivalent resistance?

If they were connected to a 3 V battery, how much total current would the battery supply?

How much current goes through each resistor?

Practice Work

1. A student in a physics lab mistakenly wired a light bulb, battery, and switch as shown in Figure 2. Explain why the bulb is on when the switch is open, and off when the switch is closed. (Do not try this—it is hard on the battery!)
2. Suppose you are doing a physics lab that asks you to put a resistor into a circuit, but all the resistors supplied have a larger resistance than the requested value. How would you connect the available resistances to attempt to get the smaller value asked for?
3. What is the resistance of ten 275- Ω resistors connected in parallel? (OpenStax 21.1) **27.5 Ω**
4. What is the resistance of a 1.00×10^2 - Ω , a 2.50-k Ω , and a 4.00-k Ω resistor connected in parallel? (OpenStax 21.2) **93.9 Ω**
5. What is the resistance of 100 5- Ω Christmas light bulbs connected in parallel? (RW) **0.05 Ω**

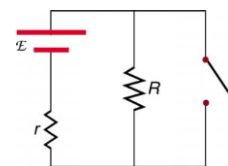


Figure 1

Physics 08-03 Parallel Circuits**Name:** _____

6. What are the largest and smallest resistances you can obtain by connecting a $36.0\text{-}\Omega$, a $50.0\text{-}\Omega$, and a $700\text{-}\Omega$ resistor together? (OpenStax 21.3) **$786\ \Omega$, $20.3\ \Omega$**
7. (a) Given a 48.0-V battery and $24.0\text{-}\Omega$ and $96.0\text{-}\Omega$ resistors, find the total current for each when connected in series. (b) Repeat when the resistances are in parallel. (OpenStax 21.6) **$0.400\ \text{A}$, $2.5\ \text{A}$**
8. Two resistors, one having a resistance of $145\ \Omega$, are connected in parallel to produce a total resistance of $150\ \Omega$. (a) What is the value of the second resistance? (b) What is unreasonable about this result? (c) Which assumptions are unreasonable or inconsistent? (OpenStax 21.12) **$-4350\ \Omega$**
9. A $10\ \Omega$, $12\ \Omega$, and a $15\ \Omega$ resistor are connected in parallel with a $9\ \text{V}$ battery. What is the (a) equivalent resistance of the circuit, (b) the current of the circuit, (c) the voltage drop on each resistor, and (d) the current through each resistor? (RW) **$4\ \Omega$; $2.25\ \text{A}$; $9\ \text{V}$, $9\ \text{V}$, $9\ \text{V}$; $0.9\ \text{A}$, $0.75\ \text{A}$, $0.6\ \text{A}$**
10. A $150\ \Omega$ and a $200\ \Omega$ resistor are connected in parallel with a $120\ \text{V}$ battery. (a) What is the voltage over the $200\ \Omega$ resistor? (b) What is the equivalent resistance of the circuit? (c) What is the total current through the circuit? (d) What is the current through each resistor? (RW) **$120\ \text{V}$; $85.7\ \Omega$; $1.4\ \text{A}$; $0.8\ \text{A}$, $0.6\ \text{A}$**