

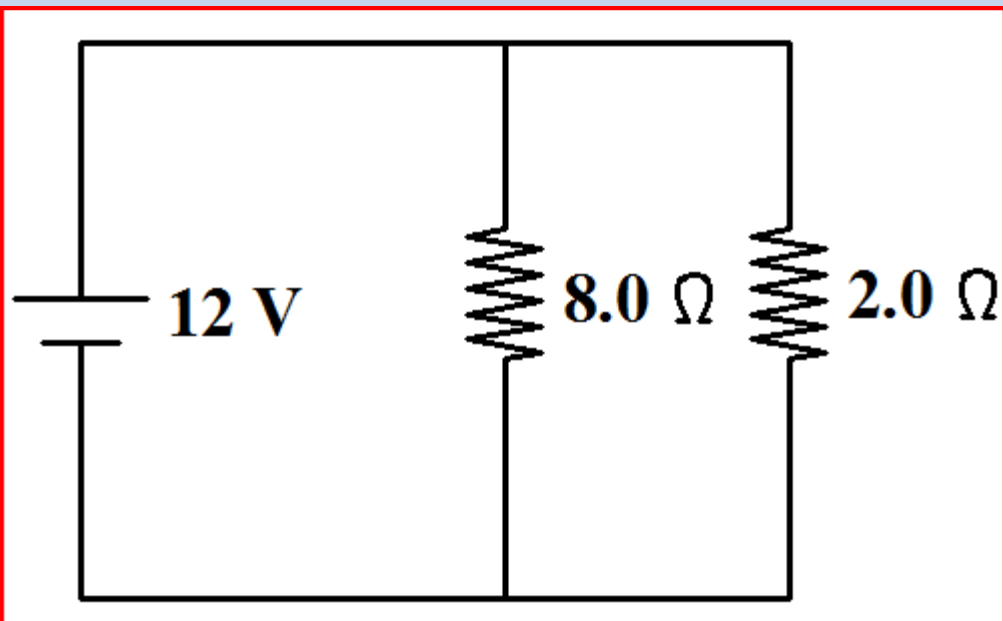
Traditional: 09-03

Themed: 06-03

Parallel vs. series resistors & cost of
electricity

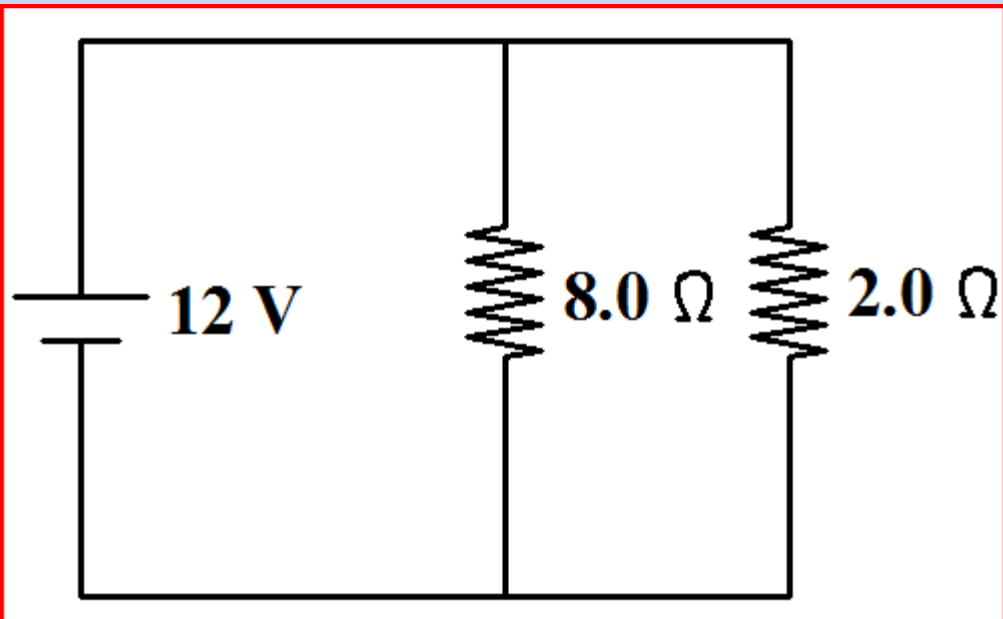
Two resistors in parallel

- You leave your car to go shopping
- To return to your car, must check out
- One cashier is really slow; the other is fast
- Which has the most resistance to the flow of shoppers?
 - Would it speed things up if there were only one cashier?
 - Does opening another traffic lane help?
 - Do you see how parallel is a fork in the road? Would a third parallel resistor help?



Two resistors in parallel

- What can you say about the overall resistance below in ohms? (>8 , >2 , <2 , between 2 and 8)?
- There's math to figure this out, we'll do that later



Cost of electricity

- This is my ComEd bill from last month
- Using 651 kw-hrs cost me \$76.12
- To nearest penny this is 11 cents/kw-hr (you'll **memorize** this)
- Three years ago we used 10 cents!

ComEd
An Exelon Company

Page 1 of 2

Account Number
Name
Service Location
Phone Number

Bill Summary
Previous Balance \$106.20
Total Payments - Thank You \$106.20
Amount Due on August 1, 2012 **\$184.73**

Issue Date July 10, 2012

Meter Information

Read Date	Meter Number	Load Type	Reading Type	Previous	Meter Reading Present	Difference	Multiplier X	Usage
7/10	06366741	General Service	Total kWh	79894 Actual	81544 Actual	1650	1	1650

Energy used: 1650 kW-hr
Cost: \$184.73
Cost per kW-hr = 11 cents
Rate = \$0.11/kW-hr

Service from 6/7/2012 to 7/10/2012 - 33 Days Residential - Single

Electricity Supply Services \$123.23

Electricity Supply Charge	1,650 kWh	X	0.06156	101.57
Transmission Services Charge	1,650 kWh	X	0.00813	13.41
Purchased Electricity Adjustment				8.25

Delivery Services - ComEd \$49.22

Customer Charge				13.22
Standard Metering Charge				2.70
Distribution Facilities Charge	1,650 kWh	X	0.01901	31.37
IL Electricity Distribution Charge	1,650 kWh	X	0.00117	1.93

Taxes and Other \$12.28

Smart Meter Program				0.02
Environmental Cost Recovery Adj	1,650 kWh	X	0.00027	0.45
Energy Efficiency Programs	1,650 kWh	X	0.00161	2.66
Franchise Cost	\$48.65	X	3.75900%	1.83
State Tax				5.45
Municipal Tax				1.87

Total Current Charges \$184.73

www.comed.com
Customer Service / Power Outage
English
1-800-EDISON1 (1-800-334-7661)
Español
1-800-95-LUCES (1-800-955-8237)
Hearing/Speech Impaired
1-800-572-5789 (TTY)
For Electric Supply Choices Visit
www.pluginillinois.org

Your Usage Profile
12-Month Usage (Total kWh)

Electric Usage

Month	kWh
Jul-11	1351
Aug-11	1576
Sep-11	1325
Oct-11	639
Nov-11	685
Dec-11	805
Jan-12	1074
Feb-12	703
Mar-12	691
Apr-12	652
May-12	679
Jun-12	859
Jul-12	1650

Average Daily

Month Billied	kWh	Temp
Last Year	43.6	72
Last Month	28.6	86
Current Month	50.0	80

Cost of electricity

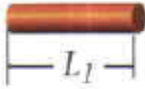
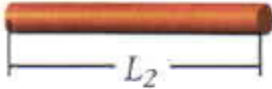




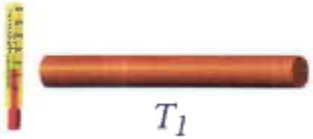

Equations to use:

- $P = iV$ (power in watts = current in amps x voltage)
- $P = E/t$ (power = energy/time)
- $E = P t$ (same equation above, solved for energy)
- **Do you pay for power or energy? How much does it cost to run a 100 W light bulb? What's missing (or Watt's missing!)?**
- Use $E = P t$ where E is kilowatt-hours (convert time to hours and power to kilowatts)
- Example: How much does it cost to run a 40 watt night light 12 hrs every night for 365 days?
- Example 2: To light a tennis court indoors at my club takes eight bright lights. I think they're 1000 watt lights. Assuming that's right and assuming my club gets an industrial rate half of mine, how much does it cost them to light up a tennis court for an hour?

Drift Velocity & Factors affecting wire resistance

- Drift velocity: Average speed of electrons in circuit...Electrons move slow, current sets up at light speed
- Yes, assume resistance for calculations, but.....
- Know what affect wire resistance
- Harder to move charge = more resistance

Table 2 Factors That Affect Resistance

Factor	Less resistance	Greater resistance
Length		
Cross-sectional area		
Material	 Copper	 Iron
Temperature		

- Has farther to go
- Has fewer electrons to help move charge
- Material property
- Hotter = more atomic vibration = more R