

2.19.20

## Electricity: Safety, Electrical Power

### Today's Objectives:

- Review modern safety equipment
- Learn which state has the most expensive electricity
- How to calculate electric power
- How electric bills get calculated
- Get comfortable with 2 step problems



## Power

If you leave a 60 Watt light bulb on for 8 hours...  
How much does this cost on your electric bill?

\$2 \$123  
63¢  
25¢ 70¢  
\$7 → 5¢  
\$0.37 \$20  
\$0.45  
\$1.23

$$\textcircled{1} E = P t$$

$$= \left( \frac{60}{1000} \right) (8)$$

$$E = 0.48 \text{ kWhrs}$$

$$\textcircled{2} \$ = E - \text{Rate}$$

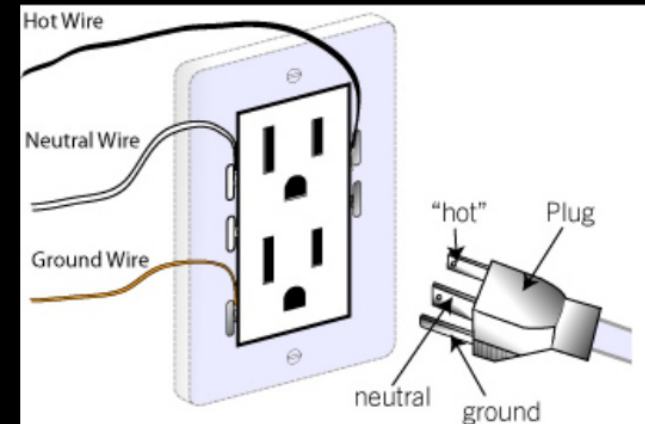
$$(0.48)(.10)$$

$$\$ = .048 \text{ or } 4.8¢$$



When you plug in a device, you are using

Alternating Current (AC)



When you are using a device with a battery, you are using

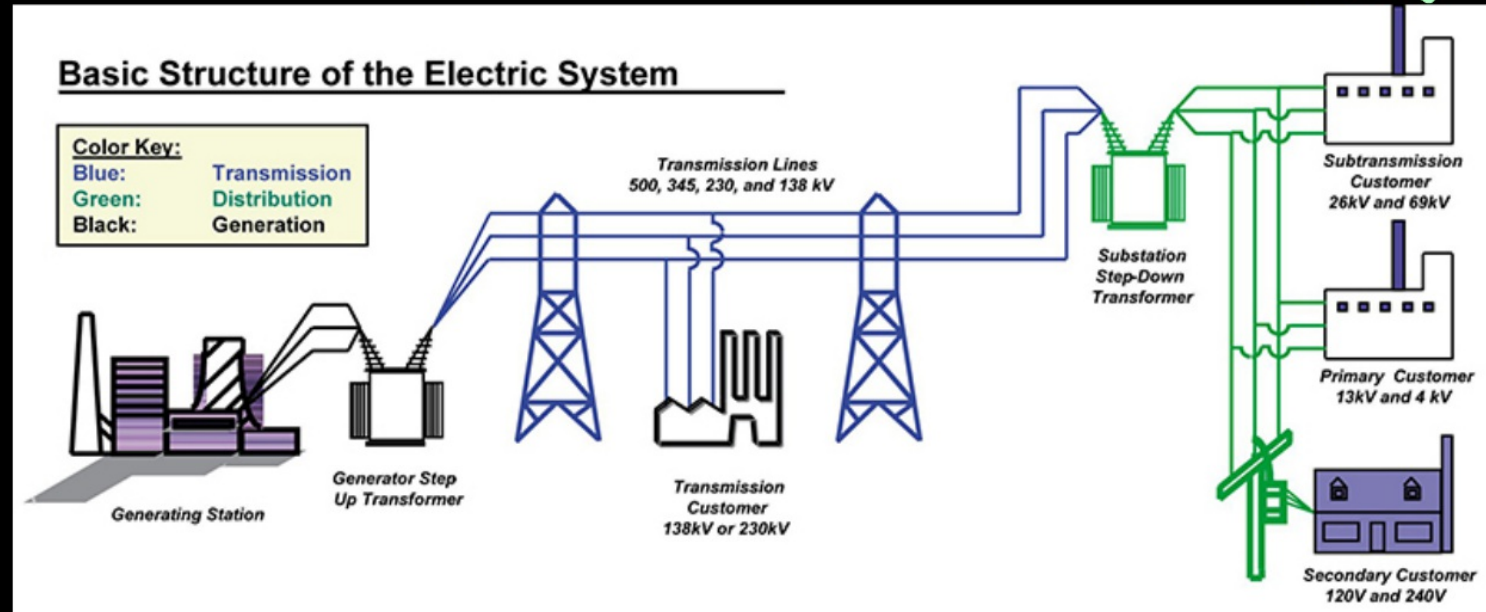
Direct Current (DC)



# Electrical Devices

## Transformer

Changes high voltage to low voltage



## Special Power Cords - contain a transformer





## Safety Devices

\* If too many amps flow, automatically shuts off \*

### Circuit Breaker



### GFI Outlet



Electric Power - how fast an appliance uses up electricity

measured in units of Watts.  
kilo = 1,000

$\div 1000$   
50,000 W  $\rightarrow$  50 kW




Equation

$$P = IV$$



P: power (watts)  
I: current (amps)  
V: voltage (volts)

[The more watts a device uses, the more expensive it is to use.]

Cell =  
6w

 <b>FOR THE HOME</b>		 <b>HEATING &amp; COOLING</b>	
Device	Running Watts	Device	Running Watts
Light Bulbs - 60 / 70 Watt	60/70	Space Heater	1800
Well Pump	1000	Humidifier - 13 Gal.	175
Refrigerator / Freezer	700	Furnace Fan Blower - 1/3 HP	700*
Microwave - 1000 Watts	1500	Window AC - 12,000 BTU*	3250*
Coffee Maker	1000	Central AC - 10,000 BTU*	1500*
Electric Stove - 8" Element	2100	Central AC - 24,000 BTU*	3800*
Color TV - 27"	500	Heat Pump	4700
Security System	500	 <b>FOR EVENTS</b>	
Computer with a 17" Monitor	800	Device	Running Watts
½ HP Garage Door	875	Radio / CD / DVD Players	50 - 200
Sump Pump ½ HP*	2100	Inflator Pump	50*
		Electric Grill	1650
		Box Fan	200
		Outdoor Light String	250

# Lightbulb Comparison

standard incandescent	CFL compact fluorescent lamp	LED
		
watts >> <b>60</b>	18	<b>10</b>
lumens >> 840	825	800
life (years) >> 0.9	9.1	<u>22.8</u>
estimated annual energy cost* >> \$7.23	\$5.18	\$1.56
initial cost \$2.00	\$2.00	\$12.00

Savings = \$5.67  
per bulb per year



10 W LED



15 W CFL



Incandescent  
100 W

Brightness is the same!



# Electric Energy

$$1\text{kW} = 1,000 \text{ watts}$$

When you get your electric bill, you get charged in units of

Kilowatt · hours

$$E = P t$$

E: energy (kwhrs)  
P: Power (kilowatts)\*  
t: time (hrs)

$$\text{\$} = E \cdot \text{Rate}$$

← Set by  
Power  
Company

