

NAME _____

Some Practice Electricity Questions:

Describe the steps in using coal to make electricity that comes to your house and makes your stove oven work. (an oven has heating coils, a fan, and a light).

Coal (chemical) → heat (some lost) → water → steam (mechanical) → turbine (mechanical, some lost to friction) → magnet turns -> (mechanical) -> induces electricity in coil of wire (electrical, around 76% efficient)--> transmitted (some lost to heat due to resistance) -> house (transformer steps down the voltage) -> house → oven (heat) and fan (mechan) and light (light)

What are the things that might change the: current, voltage, power, of the oven?

Current can be changed by adding resistance to lessen the current, voltage can be transformed by a transformer, and power will be change by current OR voltage

If an object has a -1 Charge it:

- A) has one electron B) has 10^{19} electrons
C) has 10^{19} extra electrons D) has -10^{19} electrons

Describe the difference in how electrons travel in a wire in DC and AC current:

Electrons in a DC current travel mostly in one direction, while in ac, they travel back and forth.

If electricity is like gravity, what are the similarities?

Mass **Charge**
G (gravitational acceleration) **Field**
Field
Potential Energy **Voltage**
Work

What are the differences? *Main one is that electricity can be positive or negative, so attractive or repulsive... gravity that we deal with on earth has a constant field (because the distances are so great), but electric fields change with distance.*

If two charges are moved twice as far apart, how does the force change? ***IT is a fourth as less (inverse square law)***

If my light is 100 Watts, and is attached to my house, which is 120 V, what is the typical current in the bulb?

Current is Power/Voltage = 100/120 = 0.83333 Amps

I have a device that uses 12 V of 300 mA (.3 Amps) current. What is the amount of energy it uses in 10 seconds? How much charge flows in 10 seconds? What is the current arriving into the device, and how is it changed?

Power = Voltage*Current = 12 * 0.3 = 3.6 Watts = 3.6 Joules/sec * 10 sec = 36 Joules

If it is plugged into a 120 Volt house current, that means that the voltage has been decreased by 10 times, so it really takes in 30 Amps of current. Changed by a transformer

A flashlight bulb with a potential difference of 4.5 V has a resistance of 8 ohms. How much current is in the bulb filament? How much power does it use?

Voltage = Current * Resistance. Current = Voltage/Resistance = 4.5/8 = 0.5625 Amps.

Power = Current * Voltage = 0.5625*4.5=2.53 Watts

If a light bulb has a resistance of 240 ohms when operating at 120 V, what is the current in the light bulb? What is the effective power use of the bulb? If the bulb is one for 1 second, how much energy is lost? Where did it go?

Voltage = Current * Resistance, $120 = 240 * I, I = 120/240 = 0.5 \text{ Amps}$,

Power = Current * Voltage = $.5 * 120 = 60 \text{ Watts} = 60 \text{ Joules/sec} * 1 \text{ sec}$ uses 60 Joules that is given off as heat.

If a 325 Watt heater has a current of 6 Amps, what is the resistance of the heating element?

Power = Current * Voltage, $325 = V (6), \text{voltage} = 325/6 = 54.17 \text{ Volts}$

Voltage = Current * Resistance, $54.17 = 6 * R, R = 9.03 \text{ ohms}$

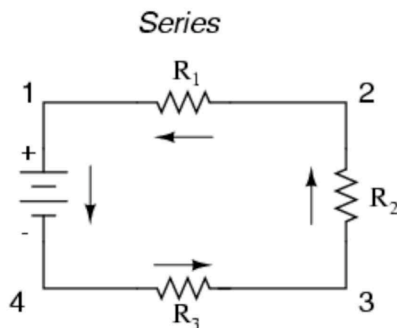
What does the electric company charge you for?

A) Power (watts) B) Current (amps) D) Voltage (voltage) **E) Energy (KW HRs)**

Explain why you might want to wire your house using parallel circuits, not series.

In a series circuit if one device goes, the current is not passed on, but in a parallel circuit, like a stream dividing, if one path is blocked, the flow continues along the other paths.

A 12 Volt battery is used to power a light bulb. There are three resistors in series, 18 ohms, 24 ohms, and 8 ohms in the circuit before the light bulb. Draw a diagram, and calculate the current through the bulb, and its power use.



Resistance = $18 + 24 + 8 = 50 \text{ ohms}$

Voltage = Current * Resistance

$12 = I * 50, \text{Current} = I = 12/50 = .24 \text{ ohms}$

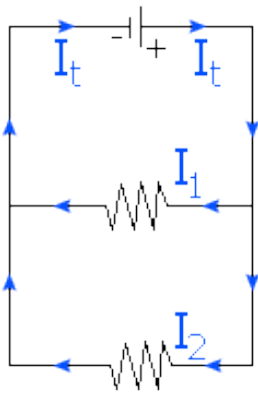
If you connected a toaster of 1200 Watts, a coffee pot of 750 Watts, and a microwave at 600 Watts to a house (120 V), how much current would they all draw if on at the same time?

They would all be in series, so the total power would be $1200 + 750 + 600 = 2550 \text{ Watts}$

Power = Current * Voltage, $2550 = I * 120, I = 2550/120 = 21.25 \text{ Amps}$

A 12 Volt battery is connected to resistors (10 ohms and 20 ohms) in parallel.

Draw a diagram



What is the voltage in each resistor?

1) Voltage is 12 V, 2) Voltage is 12 V

What is the current in each resistor?

1) Resistance = 10 ohms, Voltage = 12 V, $I = V/R = 12/10 = 1.2$ Amps

2) Resistance = 20 ohms, Voltage = 12 V, $I = V/R = 12/20 = 0.6$ Amps

What is the total current?

Total current is the two added together, $1.2 + 0.6 = 1.8$ Amps

What is the total resistance?

Voltage = 12 V, Current = 1.8 Amps,

$R = V/I = 12/1.8 = 6.67$ ohms (less than each one!)

OR $1/R_{tot} = 1/R_1 + 1/R_2$ $1/R_{tot} = 1/10 + 1/20 = 3/20$, $R_{tot} = 20/3 = 6.67$ ohms

Describe three ways to use magnetism and wire to make a current:

Move the magnet near the wire, move the wire near the magnet, move both!