Physics Wo	rksheet on El		Name: Date:	Period			
Formulas:	V = IR	P = VI	$P = I^2 R$	E = P t	$E = I^2 R t$		
Units:	nits: <u>Volts(V)</u> = Joules / Coulombs (J/C) Energy(E) = Joules (Nm) Energy(E)= KWH			<u>Power(P)</u> = Watts (Joules/sec) <u>Amps (I)</u> = Coulombs / second (C/s) Ohms(R) = Volts/Amps (Js/C ²)			
Series Circuits:				Parallel:			
$V_T = V_1 + V_2 + V_3 + \dots$ $I_T = I_1 = I_2 = I_3 = \dots$ $R_T = R_1 + R_2 + R_3 + \dots$				$V_T = V_1 = V_2 = V_3 = \dots$ $I_T = I_1 + I_2 + I_3 + \dots$ $1/R_T = 1/R_1 + 1/R_2 + 1/R_3 + \dots$			

<u>Directions</u>: Choose 10 appliances around your home and determine the cost of normal daily operation of that appliance.

Appliance	Watts	Time Used	KWH	\$/KWH	Total Cost
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Directions: Solve each of the following by showing all work and labeling all units.

- 1. A 15 Ω electric heater operates on a 120 V outlet.
 - a. What current flows through the heater? [8A]
 - b. How much energy is used by the heater in 30 seconds? [28,800 J]
 - c. How much heat is liberated by the heater in this time? [28,800 J]

- 2. A 30 Ω resistor is connected to a 60 V battery.
 - a. What is the current in the circuit? [2 A]
 - b. How much energy is used by the resistor in 5 minutes? [36,000J]
- 3. The resistance of an electric stove element at operating temperature is 11 Ω .
 - a. If 220 V are applied to it. What current flows through the element? [20A]
 - b. How much energy does the element use in 30 seconds? [132,000 J]
- 4. An electric heater is rated at only 500 Watts.
 - a. How much energy (Joules) does the heater use in half an hour? [$9 \times 10^5 \text{ J}$]
- 5. A 100 Watt light bulb is 20% efficient at producing light.
 - a. How many Joules does the light bulb convert into light each minute it is in operation? [1200 J]
 - b. How many of heat does the light bulb produce each minute? [4800 J]
- 6. How much energy does a 60 W light bulb use in half an hour? If the light bulb is 25% efficient, how much heat does it generate during the half hour? [81,000 J]
- 7. An electric space heater draws 15 A on a 120 V line. It is operated, on average, for 5.0 hours daily.
 - a. How much power does the heater use? [1.8 kw]
 - b. How much energy in kwh does it consume per month (30 days)? [270 kwh]
 - c. At \$0.08 per kwh, what does it cost to operate the heater per month? [\$21.60]