Physics Worksheet on Electrical Power

Name: _____ _____
Date: _____ Period _____

Formulas: $V = IR$ $P = VI$ $P = I^2 R$ $E = P t$ $E = I^2 R t$

Units:

Volts(V) = Joules / Coulombs (J/C)
Energy(E) = Joules (Nm)
Energy(E)= KWH

Power(P) = Watts (Joules/sec)
Amps (I) = Coulombs / second (C/s)
Ohms(R) = Volts/Amps (Js/C^2)

Series Circuits:

$V_T = V_1 + V_2 + V_3 + \ldots\ldots\ldots$
$I_T = I_1 = I_2 = I_3 = \ldots\ldots\ldots$
$R_T = R_1 + R_2 + R_3 + \ldots\ldots\ldots$

Parallel:

$V_T = V_1 = V_2 = V_3 = \ldots\ldots\ldots$
$I_T = I_1 + I_2 + I_3 + \ldots\ldots\ldots$
$1/R_T = 1/R_1 + 1/R_2 + 1/R_3 + \ldots\ldots\ldots$

Directions: 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? [9×10^5 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]