Circuits and Power

Name_____

Concepts:(power)

1) What is power?

2) What are the three equations for electrical power?

3) What are two units for power?

4) What does the "power" company sell its customers?

5) What is the unit sold by the energy company?

Concepts (circuits)

6) What three things are minimally needed to have a circuit?

7) Name three types of circuits that we will study.

8) Name three more types of circuits that we will not study in this class.

9) What defines a series circuit?

10) What defines a parallel circuit?

10) Give five characteristics that of a series resistance circuit.

11) Give five characteristics of a parallel resistance circuit.

12) What defines a combination or complex circuit?

13)   What does the term "load" refer to?

14)   What does "overloading" refer to?

15)   What is the difference between a fuse and a circuit breaker?

16)   Why do we have to include fuses and/or circuit breakers in a circuit?

17)   What is a schematic?

18)   Draw the symbols for the following:

wire   resistor

capacitor   light

cell   6 v battery

voltmeter   ammeter

fuse or circuit breaker   ground

switch   induction coil

AC source (generator)

Application:

19)   Are all of the electrons flowing in a DC circuit provided by the battery?

20)   Why must there be no "gaps" in an electric circuit for it to carry current?

21)   If four equal resistors were to be connected in series to a 6 volts source, how many volts would be impressed across each resistor?

22)   If four equal resistors were connected in series to a 6-volt source that provided 3 amps, how many amps would go through each resistor?

23) If five lights are connected in series and one burns out, what happens to the remaining light bulbs and why?

24) If four equal resistors were to be connected in parallel to a 6 volts source, how many volts would be impressed across each resistor?

25) If four equal resistors were connected in parallel to a 6-volt source that provided 3 amps, how many amps would go through each resistor?

26) If five lights are connected in parallel and one burns out, what happens to the remaining light bulbs and why?

27) In which would there be more current, a series or parallel resistance circuit and why?

28) In which would there be more voltage, a series or parallel resistance circuit and why?

29) In which would there be more resistance, a series or parallel resistance circuit and why?

30) What happens to the total resistance if more resistors are added to a series resistance circuit? Why?

31) What happens to the total resistance if more resistors are added to a parallel resistance circuit? Why?

32) Why would more devices (i.e. hairdryers, TVs, radios, too many lights, curling irons, toasters) cause the circuits in your house to overload?

33) Is your house connected in parallel or series and why?

34) As more and more bulbs are connected in series what happens to the brightness of each bulb?

35) As more and more bulbs are connected in parallel what happens to the brightness of each bulb?

36) Which type of circuit would use up a battery faster?

37) $\Delta V = 60$ volts, $I = 10$ amps, find the power used by the device.

38) $\Delta V = 120$ volts, $P = 100$ watts, find the amount of current drawn used by the device.

39) $P = 200$ W , $I = 15$ amps, find the voltage used by the device.

40) $\Delta V = 6$ volts, $I = 4$ amps, find the power used by the device.

41)   If you left your front light (60 watts) on for one year (365 days, 24 hours per day), how many kilowatts- hrs would you use and if each KWH cost 6.4 cents, how much would it cost your parents?

42)   If you have to choose between a 1000 Watt microwave to cook a potato or a 400 Watt oven, which will cost you less and why (show numbers to support your conclusion)?

43)   Write done all of the electrical devices you use in your bedroom and bathroom, estimate the number of hours you use them each week and calculate how much you cost your parents in energy each week.

44)   Use your power bill to estimate the annual consumption of energy by all the households in Sioux Falls. (135,000 people, 2.6 people per household)
        (extra credit – bring in a copy of your power bill so I can show you how to read it)

Circuit problems: For each of these problems show all work and all schematics for each resistor and the complete circuit. Each problem should also show the equivalent circuit with the equivalent resistance, voltage, power and current as the final step. Also include a voltmeter and ammeter.

45) Three resistors each with a resistance of 45 ohms in a series circuit with a voltage source of 12 volts.

46) Four resistors of 10 ohms, 100 ohms, 220 ohms and 310 ohms in a series circuit with a 6 volt battery.

47) Three resistors of 20 ohms, 20 ohms, and 40 ohms with a current of 2.5 amps.

48) Two resistors of 30 ohms in a parallel circuit with a 45 volt power supply.

49)   Three resistors of 10 ohms, 20 ohms, and 30 ohms in a parallel circuit with a 12 volt battery.

50)   Three resistors of 22 ohms, 35 ohms, and 450 ohms in a parallel circuit with a 60-volt power supply.

52)   Five resistors in parallel of your choosing with a 4.5 volt power supply.

53)   This is a combination circuit problem. Connect to 20-ohm resistors in parallel and then connect the pair in series to a 40-ohm resistor with a 6-volt power supply.

54)   Again a combination circuit. Connect three resistors of 22, 45, and 65 ohms in parallel and then connect them in series with 100 ohm, a 75 ohm resistor and a 12 volt source.

55)   Solve the following for all values.