RESISTOR CONCEPTUAL QUESTIONS

13.20) In the circuit in Figure II, the current through the 12 Ω resistor is .5 amps.

a.) What is the current through the 8 Ω resistor?

b.) What is the power supply's voltage?

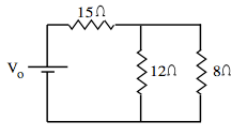

FIGURE II

13.21) In Figure III, R_2 is decreased. Assuming an ideal power supply, what happens to:

a.) R_2's voltage;

b.) R_2's current;

c.) R_1's voltage;

d.) the power dissipated by R_2?

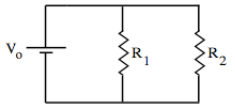

FIGURE III

13.29) Examine Figure VII:

a.) How many nodes are there in the circuit?

b.) How many loops?

c.) Write out any three *node equations* using the information provided in the circuit.

d.) Write out any three *loop equations*.

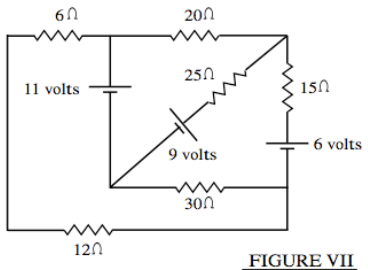

FIGURE VII

13.14) Without changing anything else, you double the current through a resistor. How will that affect the power being dissipated by the resistor?

13.15) You have a resistor attached to an ideal power supply. You halve the resistance of the resistor. How will that affect the power being dissipated by the resistor?

13.17) You have a 10 watt light bulb and a 20 watt light bulb hooked in series in a circuit. Which bulb would you expect to have the greater resistance?

13.27) Using as many 12 Ω resistors as you need, produce a resistor circuit whose equivalent resistance is:

a.) 18 Ω; and

b.) 30 Ω.

The power dissipated by two resistors in series is 48 watts. How much power will be dissipated by the same two resistors if they are put in parallel?

The power dissipated by two resistors in series is 48 watts. How much power will be dissipated by the same two resistors if they are put in parallel?

Noting that the equivalent resistance of the series combination is 2R, what can we write about the two resistors in series?

$$P = i^2 R_{net}$$
$$\Rightarrow \quad 48 = i^2 (2R)$$
$$\Rightarrow \quad 24 = i^2 R$$

To begin with, the equivalent resistance of the new circuit with the resistors in parallel will be R/2. With that bit of information, what can we say about the new current?

If the series equivalent resistance is 2R and the parallel equivalent resistance is R/2, the net resistance has changed due to the circuit change by 1/4. That means the current in the parallel circuit has gone up by 4. Sooo, for the second circuit we can write:

$$P_{new} = (4i)^2 R_{new}$$
$$\Rightarrow \quad P_{new} = (4i)^2 (R/2)$$
$$\Rightarrow \quad P_{new} = 8\left(i^2 R\right)$$
$$\Rightarrow \quad P_{new} = 8(24\ \text{V})$$
$$\Rightarrow \quad P_{new} = 192\ \text{watts}$$