Name Key Hour

Electricity and Circuits Test Review

If you scored a 52/60 or higher on the complex circuit quiz you may skip #18.

My score on the circuit quiz was ____/60.

1. Fill in the chart below:

Variable	What it stands for	Unit measured in	Abbrev. for unit
W	work		J or kWh
P	power	kilowatts = kW, watts = W	
I	current		A
ΔV	voltage (potential difference)		V
R	resistance	ohms	Ω

2. Power needs to be in watts to use the P=W/Δt equation
3. Power needs to be in kW to find the cost of an appliance.
4. How much current does a 1000-Watt stove draw? (8.33 A)

$P = I\Delta V$ $1000 = I(120)$ $I = 8.33\ A$

5. A 50 Ω resistor has a current of 0.09 A running through it. What is the voltage? (4.5 V)

$\Delta V = IR$ $\Delta V = (0.9)(50)$ $\Delta V = 4.5\ V$

6. An electric space heater uses 1,500 W of power. Calculate the resistance of the space heater. (9.6 Ω)

① $P = I\Delta V$ $1500 = I(120)$ $I = 12.5\ A$

② $\Delta V = IR$ $120 = 12.5R$ $R = 9.6\ \Omega$

7. Dakota Electric charges $\$.101$ = 10.1 cents for 1 kWh of electricity.

8. Calculate the cost of running a 1200 W hair dryer for 10 minutes. (≈ $0.02 or 2 cents)

$P = 1200\text{watts} = 1.2\text{kW}$ $P = \frac{W}{\Delta t}$ $\Delta t = \frac{10\text{min}}{60} = 0.167\text{hr}$

$1.2\text{kW} = \frac{W}{.167\text{hr}}$ $W = .2\text{kWh} \times \$.101 =$ $\$.02$ or 2¢

9. How much does it cost to wash a load of laundry if you run a 1150 W washer for 30 minutes and a 4400 W dryer for 65 minutes. (≈ $0.54)

washer: $P = 1150\text{W} = 1.150\text{kW}$ $\Delta t = \frac{30\text{min}}{60} = 0.5\text{hr}$

$1.150 = \frac{W}{.5}$ $W = .575 \times \$.101 = \$.058$

dryer: $P = 4.4\text{kW}$ $\Delta t = 1.083\text{hr}$

$4.4 = \frac{W}{1.083}$ $W = 4.77\text{kWh} \times \$.101 = \$.48$

$.058 + .48 =$ $\$.538$ or $53.8¢$

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$\Delta t = 4.5 \times 5 = 22.5\ hr$

$P = .36\ kW$

10. The old overhead bulbs are 360 W, while the new LCD projectors use a 250 W bulb. How much money will I save in 1 week if I use the LCD projector for 4.5 hours a day for 5 days instead of the overhead? (≈ $0.25)

old:

$.36 = \frac{W}{22.5}$ $W = 8.1 \times \$.101 = \$.82$ or 82¢

new

$.25 = \frac{W}{22.5} = 5.625 \times \$.101 = \$.568$ or 57¢

$.82 - .568 =$

$.25 or 25¢

11. 1 Joule = 1 watt·sec

12. Convert 120 kWh into Joules (watt·sec). (4.32×10^8 J)

$120\ kW \cdot hr \times \frac{1000\ W}{1\ kW} \times \frac{3600\ sec}{1\ hr} =$ **$4.32 \times 10^8\ J$**

13. Convert 3,400,000 J (watt·sec) into kWh. (0.94 kWh)

$3400{,}000\ watt \cdot sec \times \frac{1\ kW}{1000\ W} \times \frac{1\ hr}{3600\ sec} =$ **0.94 kWh**

14.

a. If your electric meter has a Kh reading of 7.2…that is the work done (in Wh) in one spin. If it takes 2.5 sec for one spin, how much power is your house putting out? (10,368)

$P = \frac{W}{\Delta t}$ $W = 7.2\ watt \cdot hr$ $\Delta t = \frac{2.5\ sec}{3600} = .000694\ hr$

$P = \frac{7.2\ watt \cdot hr}{.000694\ hr} = 10{,}368\ watts$

b. What units is the power in? watts

c. If you continue at that rate of power, how much would it cost to operate all of those appliances for 24 hours a day, for 30 days? (≈ $754)

$P = \frac{W}{\Delta t}$ $P = 10.368\ kW$ $\Delta t = 24 \times 30 = 720\ hr$

$10.368\ kW = \frac{W}{720\ hr} = 7465 \times \$.101 =$ **$754**

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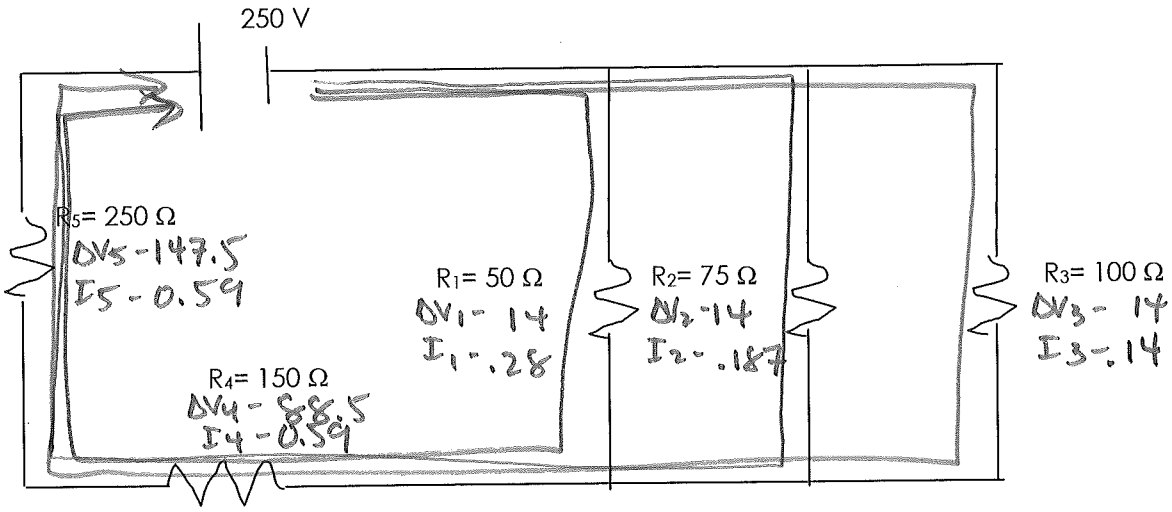
15. Know the definitions for circuit, voltage, current, and resistance.
16. Resistors in series have 1 path(s) for the current to flow through.
17. Resistors in parallel have multiple path(s) for the current to flow through.
18. Answer the following questions using the diagram below:



a. Calculate the total resistance of the circuit. (423 Ω)

$\frac{1}{50} + \frac{1}{75} + \frac{1}{100} = 23.1 + 250 + 150 = 423.1\ \Omega$

b. Calculate the total current of the circuit. (0.59 A)

$\Delta V = I R$

$250 = I(423.1)$ $\quad I = 0.59\ A$

c. What is the voltage across R_3? (14 V)

$\Delta V_3 + \Delta V_4 + \Delta V_5 = 250$

$\Delta V_3 + 88.5 + 147.5 = 250$ $\quad \Delta V_3 = 14\ V$

d. What is the current across R_2? (0.18 A)

$\Delta V_2 = 14 V$ to 00 so $\Delta V_2 = I R$

$14 = I(75)$ $\quad I_2 = .187\ A$

e. What is the voltage drop and current across R_1? (14 V, 0.28 A)

$\Delta V_1 = 14\ V$ so $\Delta V_1 = I R$

$14 = I(50)$ $\quad I = 0.28\ A$

f. What is the voltage drop and current across R_5? (147.5 V, 0.59 A)

all the current, so 0.59 A

$\Delta V_5 = I R$

$(.59)(250) = 147.5\ V$