Group Work for 18ABDE   Name _____

A. Ohm's Law: $R = \dfrac{V}{I}$

1. How much current flows when you hook a 45.0 Ω heater up to a 117 V source?

2. A resistor is connected to 5.00 V and there is a current of 125 mA flowing. What is the resistance?

3. What is the voltage across a 220. Ω resistor with a current of 12.0 mA flowing through it?

4. If you want to limit the current to 0.450 A, what resistance would you use with 12.0 V

B. Power: $P = VI = I^2R = \dfrac{V^2}{R}$

5. What must be the current flowing through a 945 Watt heater connected to a 12.0 V source?

6. A 1400. W heater plugs into a 120. V source. What must be its resistance?

7. A 165 W heater has a resistance of 1.85 Ω. At what voltage must it operate?

8. A 385 Ω resistor is rated at 0.250 Watts. What is the maximum current that can flow through it?

C. Current: $I = \dfrac{\Delta q}{\Delta t}$

9. What time must a 215 mA current flow to deliver 2.30 C of charge?

10. A capacitor bank is charged at an average rate of 0.312 A. What charge is moved in 2.00 minutes?

D. Crazy Mixed Up Power And Energy: (Students struggle with these)

$$P = VI = I^2R = \frac{V^2}{R} \qquad power = \frac{energy}{time} \qquad Q = mc\Delta T \qquad \Delta E_p = mg\Delta h \qquad E_K = \frac{1}{2}mv^2$$

11. An elevator motor must draw 15.1 A of current, and lift an 875 kg elevator from the ground to a height of 22.5 m in 58.0 s. What must be the input voltage for the elevator?

12. A 1.95 Ω heater core operating at 32.0 V is used to heat 1.40 liters of water initially at 21.0 °C. What time will it take to reach boiling if it loses no heat to the surroundings? (Cwater = 4186 J kg^{-1} °C^{-1})

13. A 78.0 kg go cart is sped up from rest by a motor with an effective resistance of the 0.961 Ω, and that draws an average of 12.5 A of current. What is the final speed of the go cart after 10.0 seconds assuming there is no friction or other losses?

E. RMS Problems:

$$V_{rms} = \frac{V_0}{\sqrt{2}} \qquad I_{rms} = \frac{I_0}{\sqrt{2}} \qquad R = \frac{V_0}{I_0} = \frac{V_{rms}}{I_{rms}} \qquad P_{max} = I_0V_0 \qquad \bar{P} = \frac{1}{2}I_0V_0 \qquad P = VI = I^2R = \frac{V^2}{R}$$

14. A 12.2 Ω heater is connected to an alternating current with a peak voltage of 172 V. What is the power dissipated?

15. A heater runs on alternating current. The peak voltage across the heater is 35.0 V, and the peak current through the heater is 3.80 A. What is the power consumption of the heater?

16. A 1400. Watt heater runs on alternating current at 120. V (RMS). What is the peak current flowing?

17. What is the power of a heater that operates with a peak current of 12.9 A and has a resistance of 2.50 Ω?

18. A 113 Ω heater is dissipating 825 W of power. What must be the peak voltage if it operates on an alternating current source?