Topic 5.2 – Heating effect of electric circuits **Formative Assessment**

NAME: _____ TEAM:__

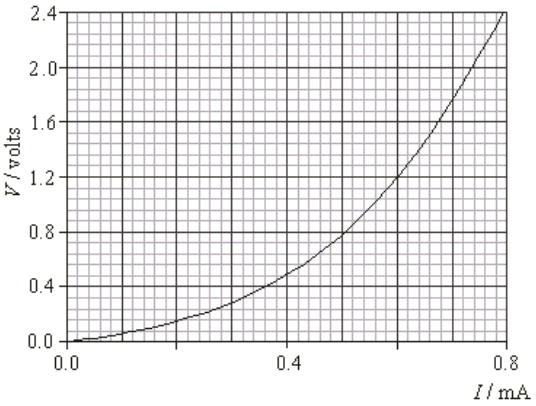
*THIS IS A PRACTICE ASSESSMENT. Show formulas, substitutions, answers (in spaces provided) and units!*

*A carbon-core resistor consists of a carbon rod having a length of 8.75 mm, a diameter of 0.0250 mm and a resistivity of $3500 \times 10^{-8}\ \Omega m$.*

1. What is the value of the cross-sectional area of the carbon rod. Be sure your answer is in $m^2$.
   1. _____
2. What is the resistance of the carbon rod? 2. _____

3. If a current of 1.75 A passes through the resistor, what is the voltage across the resistor?
   3. _____

*An unknown material has the V-I characteristics shown in the graph.*




4. What is the resistance of the material when the current is 0.2 mA? 4. _____

5. What is the resistance of the material when the current is 0.7 mA? 5. _____

6. What is the resistance of the material when the voltage is 1.2 V? 6. _____

7. Is this material ohmic? Explain. _____. _____.

*A voltmeter records the displayed potential difference when the leads are placed across a 2200 $\Omega$ resistor.*

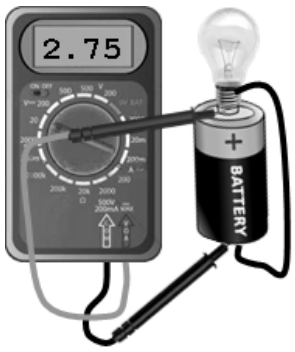

8. What is the current passing through the resistor? 8. _____

9. How much charge passes through the resistor in exactly 1.5 minutes?
   9. _____

10. How much electrical energy is required to pass the charge you found in (8) through the resistor?
    10. _____

11. What is the fractional error in the voltage measurement? 11. _____

*A filament lamp has a rating of 1.50 W. While the bulb is lit, the meter displays the value shown.*

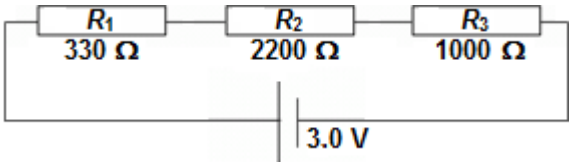



12. What is the power dissipation of the lamp? 12. _____

13. What is the current in the lamp? 13. _____

14. What is the resistance of the lamp? 14. _____

*A series circuit powered by a 3.0 V cell is shown.*

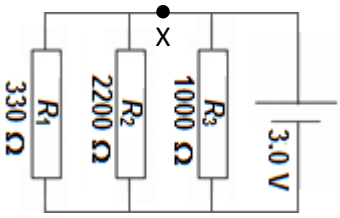



15. What is the total or equivalent resistance of this circuit? 15. _____

16. What is the current through this circuit? 16. _____

17. What are the voltages across each resistor? 17. $V_1$ = _____
$V_2$ = _____
$V_3$ = _____

*A parallel circuit powered by a 6.0 V cell is shown.*



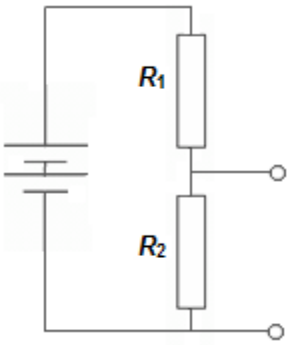

18. What is the total or equivalent resistance of this circuit? 18. _____

19. What is the current through the cell? 19. _____

20. What are the currents through each resistor? 20. $I_1$ = _____
$I_2$ = _____
$I_3$ = _____

21. What is the current through the point X? 21. _____

*A series circuit powered by a battery whose voltage is 6.0 V is shown in the schematic diagram.*



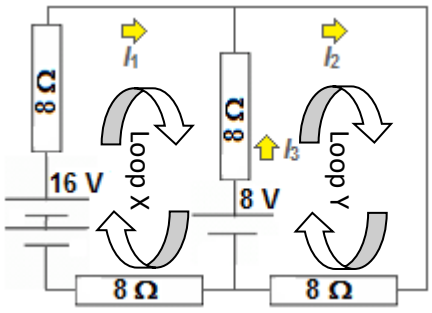

22. Label $V_{OUT}$ and $V_{IN}$ in this circuit. 22. In diagram

23. Suppose the value of $R_1$ is 2400 Ω. If we would like to "tap" 1.5 V at $V_{OUT}$ what should the value of $R_2$ be? 23. _____

24. Suppose the value of $R_2$ is 2400 Ω. If we would like to "tap" 1.5 V at $V_{OUT}$ what should the value of $R_1$ be? 24. _____

25. What is this type of circuit called? 25. _____

*A circuit constructed of resistors and two voltage sources is shown.*




26. Use Kirchhoff's rule for *I* and write the current equations for each junction. 26. _____

27. Use Kirchhoff's rule for *V* and write the voltage equation for Loop X. 27. _____

28. Use Kirchhoff's rule for *V* and write the voltage equation for Loop Y. 28. _____

29. Find the values of the three currents and the four resistor voltages. Write them in the diagram.