

**Vasquez High School -- Physics -- Test #4 -- Chapter 16-18 -- S' 2015 -- 100 points**

Write TRUE if the statement is true OR write the word or words that substitute(s) for the underlined word or words that would make it true. Writing false only earns partial credit. Three points apiece.

- \_\_\_\_\_ 1) The electronic device used to store electrons, like water in a bucket, is the capacitor.
- \_\_\_\_\_ 2) The units of electric potential difference are volts.
- \_\_\_\_\_ 3) The amount of charge that passes a certain point in a certain amount of time is called the electric current.
- \_\_\_\_\_ 4) If two resistors, a 30 ohm and a 60 ohm, are in series, the total resistance would be 90 ohms.
- \_\_\_\_\_ 5) When an object has more positive charge on one side and more negative charge on the other side, we say the object is electrically influenced.
- \_\_\_\_\_ 6) Amperes times ohms equals volts.
- \_\_\_\_\_ 7) The watt is the unit of electric power. One watt equals one ampere time one volt.
- \_\_\_\_\_ 8) Alternating current is called that because the current rapidly changes polarity.
- \_\_\_\_\_ 9) The electric field inside a spherical conductor varies everywhere inside the conductor.
- \_\_\_\_\_ 10) The material between the plates of a capacitor is called the insulator.

Short Answer -- Fill-in. Be neat, clear and complete. If I cannot read it, you get bupkes. Three points.

- 11) The proper SI units of electric field are \_\_\_\_\_
- 12) Describe why very high voltages are used to transmit electricity over long distances. \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- 13) Name three of the four things that resistance depends upon: \_\_\_\_\_
- \_\_\_\_\_
- 14) One point apiece. Write the name and symbol of the SI unit for each of the following quantities.
- |                  |               |
|------------------|---------------|
| Resistance _____ | Current _____ |
| Voltage _____    | Power _____   |
| Charge _____     |               |

Multiple Choice Section. Write the letter in the blank that best answers each example. Two points each.

- \_\_\_\_\_ 15) What is the voltage across a 100-ohm circuit element that draws a current of 2 A?
- a) 200 V                      b) 100 V                      c) 50 V                      d) 25 V
- \_\_\_\_\_ 16) Which of these is NOT a proper way for calculating power?
- a) energy divided by time                      b) work times distance  
c) current times voltage                      d) current squared times resistance
- \_\_\_\_\_ 17) Consider the electric force between a pair of charged particles a certain distance apart. By Coulomb's Law, if the charges of both particles are doubled and the distance between them is also doubled, how is the electric between them changed as compared to the original situation?
- a) 8 times as great                      b) 4 times as great                      c) 2 times as great  
d) exactly the same                      e) 1/2 as great
- \_\_\_\_\_ 18) Consider a single loop direct current circuit having a battery and one resistor. If another resistor of the exact same value as the first is added to the circuit in a parallel branch to the first resistor, making another loop, how is the overall current in circuit changed?
- a) 2 times as great                      b) exactly the same                      c) 1/2 as great  
d) none of the above
- \_\_\_\_\_ 19) Considering conductivity, which of the following does not belong in the group?
- a) wood                      b) plastic                      c) rubber                      d) aluminum                      e) glass

Problem/Calculation Section. As usual, be organized, neat and complete. Write appropriate equations where applicable. Five points apiece unless specified otherwise.

- 20) How much charge passes through a point on a wire in one hour if the current is 2.5 A?
- 21) How much current flows in an 600 ohm resistor when 1.8 volts are impressed on it for exactly 60 seconds?

22) Ten points on this one. Consider the electron and proton of a hydrogen atom are separated, on average, by a distance of  $5.3 \times 10^{-11}$  m. Find:

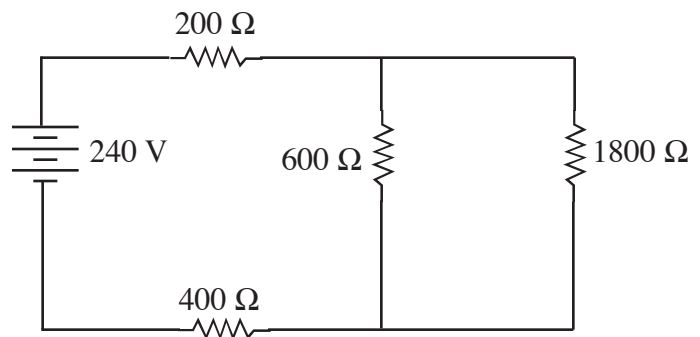
- a) the gravitational attraction between the particles
- b) the electrostatic attraction between the particles
- c) the ratio of force “b” to force “a”

$(m_e = 9.11 \times 10^{-31}$  kg and  $m_p = 1836m_e)$

$(G = 6.67 \times 10^{-11}$  N•m<sup>2</sup>/kg<sup>2</sup>)

23) Ten points on this one. Three charges,  $q_1 = 2$  nC,  $q_2 = -5$  nC, and  $q_3 = 3$  nC are respectively placed at the points (3m, 0), (0, 0) and (0, 4m). Calculate the magnitude and direction of the electric field at the point (3m, 4m).

24) Ten points here too. Determine the current in this circuit and the voltage drop across the 200  $\Omega$  and 1800  $\Omega$  resistors. Ten points.



25) Lastly, consider the following circuit. What voltage must the battery be so that the overall current is 0.5 A?  
Five points here.

