Electricity Test Review (Ch. 32-35)

Formulas Provided: $F = K\frac{q_1 q_2}{d^2}$ $I = \frac{V}{R}$ $P = IV \text{ or } P = \frac{V^2}{R}$

Coulomb's Law Ohm's Law Power

SIMPLEY READING MY ANSWER KEYS IS NOT STUDYING!!! IT WOULD BE BEST IF YOU COMPLETED THIS REVIEW ON YOUR OWN AND COMPARE YOUR ANSWERS TO MINE. THE PROCESS OF YOU GOING THROUGH AND FINDING ANSWERS THAT YOU DO NOT KNOW IS STUDYING.

1. How do charges act: (2 positive, 2 negative, or one positive and one negative.) **Opposite charges attract, like charges repel.**
2. Describe electric fields and how charges interact in the fields. **Electric fields are the area around charges where electric forces can be. The arrows always show the direction a positive charge would move in an electric field. The arrows point towards a negative charge and away from a positive charge.**
3. What types of charges will repel. **A positive will repel a positive, and a negative will repel another negative.**
4. What are the ways you can charge an object? **You can charge an object by contact, friction, and induction. (you shouel look up the difference between those 3 methods)**
5. Use Coulomb's law to explain the factors that determine how strong the force of attraction or repulsion is between two like or unlike charges. **Coulombs law ($F = K\frac{q_1 q_2}{d^2}$) describes the relationship between Force, charge, and the distance between the charges. The magnitude of the force is directly related to the charge (q) and inversely related to the distance between the charges (d).**
6. According to Coulombs law what happens to the force between charges if you A) double one charge **Double the force**, B) double both charges **Quadruple the force(x4),** C) decrease the distance by one half, **multiple the force by x4** D) Double the Distance. **Make the force ¼ as strong. Instead of memorizing these particular amounts, it would be better to actually calculate with simple numbers (2, 4, etc) and then calculate again to compare the overall force.**
7. What two things do you need to allow charge to flow through a circuit? **You need a path for charge to follow (AKA a conducting path) and you need a push for the charge or a potential difference (AKA voltage)**
8. Be able to briefly summarize the law of conservation of charge. **Charge cannot be created or destroyed. TI can be transferred, or changed into something else, but it cannot be created or destroyed.**
9. Be able to describe what charge, potential difference (AKA voltage), and resistance are. **Charge is the flow of electrons through a conductor. The flow of charge is measured in Amperes (AKA amps) which is 1 Coulomb of charge per seconds through a conductor. Potential difference, or voltage, is the push for charge. Charge cannot flow without voltage pushing it. Resistance (Measured in Ohms, Ω) is when charge is used up and turned into something else (i.e light, motion with a motor)**
10. Compare and contrast an electrical conductor and insulator. **Conductors allow charge to flow through them easily. This is due to the abundance of electrons that are shared throughout the conductor.**

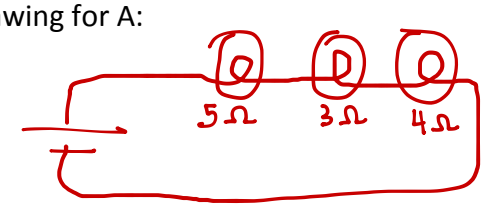
Insulators do not allow much charge to flow through them. Metals are good conductors and rubber, wood, Styrofoam are examples of poor conductors (also called insualtors.)

11. What are the SI units for charge **Amperes or Amps**, potential difference (AKA voltage) **VOLTS**, and resistance? **Ohms (Ω)**
12. What is charge? **The flow of electrons through a conductor.**
13. Compare and contrast series and parallel circuits. Which is used to wire electricity through a house or building and why? **Series have one path for charge to flow. Parallel circuits have multiple paths (branches) for charge to flow. Voltage drops through each resistor (or bulb) in series but voltage is constant throughout an entire parallel circuit. Current is constant throughout a series but current splits among the branches of a parallel circuit. Series and parallel circuits both follow phms law. Total resistance in series is the sum of the resistors, and total resistance in parallel is the inverse of the sum of te inverses of the resistors.**

Problems: Be able to solve for any part of Coulomb's Law, Ohm's Law (both work problems and circuits), and Power.

A. Draw a series circuit with a 24 V battery and the following bulbs connected in series 5 ohms, 3 ohms and 4 ohms. What is the total resistance? **$R_1 + R_2 + R_3$ = Total resistance is 12Ω**
B. The same series circuit above (A), what is the total current? **I = V/R = 24V / 12Ω = 2Amps**
C. The same series circuit above (A), what is voltage drop through the 4 Ω resistor? **V = I·R = 2A * 4Ω = 8V**
D. Draw a parallel circuit with a 24 V battery and the following bulbs connected in parallel: 5 ohms, 3 ohms and 4 ohms. What is the total resistance in this circuit? **$1/R_t = 1/R_1 + 1/R_2 + 1/R_3 = 1.28Ω$**
E. In the same parallel circuit above (part C), what is the total current? **I = V/R = 24V/1.28Ω=18.75Amps**
F. In the same parallel circuit above (part C), what is the current through just branch 2 (the 3 Ω branch)? **I=V/R = 24V/3Ω = 8 Ams**
G. Add the above in parallel. **Branch 1 = I=V/R = 24V/5Ω = 4.8 Ams; I=V/R = 24V/3Ω = 8 Ams; I=V/R = 24V/4Ω = 6 Ams**
4.8A + 8 A+6A = 18.8 A
H. V= IR, when a 9V battery is connected to a resistor, and 4 amps of current are flowing through it, what is the value of the resistor? **R = V/I = 9V/4= 2.25Ω**
I. When connected to a 120 V power supply, how much current exists through a 200 ohm resistor? **I=V/R = 120V/ 200Ω = 0.6amps**
J. How much power is used by a 12V batter that draws 3 amps of current? **P=IV = 3A * 12V = 36 Watts**
K. What is the current through a 75 Watt light bulb that is in a 120 volt circuit? **P=IV so I=P/V = 75W/120V = 0.625 Amps**
L. A 12V car battery is connected in a circuit and provides 5 A of current. What is the resistance in their circuit? **I=V/R so R=V/I = 12V/5A = 2.4Ω**

Drawing for A:



Drawing for D: