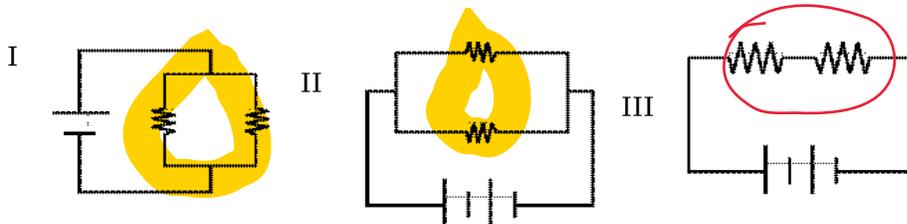


UBSP-Electricity homework

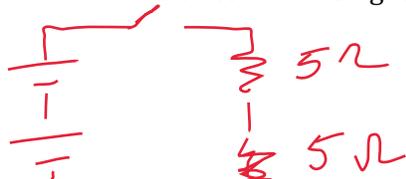
- Describe the interactions between the following two charges:
 - Like charges will attract
 - Opposite charges will repel
- Explain what current is. **Flow of electrons**
- Explain what resistance is. **resistance to the flow of electrons**
- Explain what voltage is. **Electrical potential difference between two points**
- Explain what electrical potential is. **Voltage**
- What are the units of electrical potential? **volts**
- What are the units of current? **Amps**
- Explain why current flows in that direction. (Hint, you should be explaining the movement of electrons) **negative (-)---> positive (+)**
- Explain what an insulator is and give me 2 examples of insulators. **Insulators have high resistance and do not allow electrons to travel through easily.**
Examples are: Rubber plastic, wood, glass...
- Explain what a conductor is give me 2 examples of conductors. **A conductor have low resistance and do allow electrons to travel through easily**
- Solve for R and V using Ohm's law.
- Potential difference is the same thing as what electricity term?
 $R=V/I$ $V=I/R$
- What are the two types of current? Explain the differences between each.
 - Type 1 - **DC**
 - Type 2 - **AC**
- Discuss the three ways to reduce resistance. Give an example of each.
 - 1 - **reduce temperature**
 - 2 - **thicker wires or short wires**
 - 3 - **better wires (material)**
- Explain what a circuit is: **a closed path along which electrons can flow**
- What is the difference between an open and closed circuit?
Open: there is a gap and electrons can not flow
Closed circuit: a path were electrons can flow without gabs
- What is the difference between a series (**single-pathway circuit**) and a parallel circuit (**a branched pathway circuit**)?

Drawings:

18. Label the circuits shown to the right as either series, parallel, or both.



19. Draw a series circuit with 2 batteries and two lightbulbs with a resistance of $5\ \Omega$ each, and an open switch.



20. Draw a parallel circuit with 1 battery, 3 branches each with a light bulb. The resistance of each light bulb is $2\ \Omega$.



21. What will happen if a bulb is removed from each circuit? Be specific.

- The series circuit - **A break anywhere in the path results in an open circuit; electron flow ceases**
- The parallel circuit - **A break in any path doesn't interrupt flow in other paths**

22. What are benefits for using a parallel circuit as opposed to a series circuit? **you can turn off part of the circuit without affecting other parts**

Calculations: SHOW YOUR WORK OR YOU DON'T GET CREDIT

23. A clothes dryer is equipped with an electric heater that works by passing air across an electric wire that is hot because of the current in it. The wire's resistance is $10.0\ \Omega$, and the current in the wire equals $24\ \text{A}$. What is the voltage across the heater wire?

$$I = \frac{V}{R} \rightarrow V = IR = 24 \times 10 = 240 \text{ volts}$$

24. An electric car is equipped with a motor that can deliver $50\ \text{hp}$. The voltage across the motor's terminals equals $500\ \text{V}$, and the resistance in the motor's circuit is $7.5\ \Omega$. How large is the current in the motor?

$$I = \frac{V}{R} = \frac{500}{7.5} = 66.7 \approx 67 \text{ amps}$$

25. A TV is plugged into a $120\ \text{V}$ outlet. The current in the TV is equal to $0.75\ \text{A}$. What is the overall resistance of the TV?

$$I = \frac{V}{R} \rightarrow R = \frac{V}{I} = \frac{120}{.75} = 160\ \Omega$$

26. A refrigerator's circuit has a current equal to $0.647\ \text{A}$ in it when the voltage across the circuit equals $116\ \text{V}$. What is the resistance of the circuit?

$$R = \frac{V}{I} = \frac{116}{0.647} = 179\ \Omega$$

27. A window-unit air conditioner has an overall resistance of 22Ω . If the voltage across the air conditioner equals 115 V , what is the current in the air conditioner's circuit?

$$I = \frac{V}{R} = \frac{115 \text{ V}}{22 \Omega} = 5.2 \text{ amp}$$

28. A washing machine motor works because of a current of 9.8 A in a circuit with a resistance of 12.2Ω . What is the voltage across the terminal?

$$V = IR = 9.8 \times 12.2 = 120 \text{ volts}$$

Drawings AND Calculations (optional problems):

29. Use the drawing to the right to answer the following questions.

a. What is the voltage of each battery?

$$6 \text{ V}$$

b. Calculate the total resistance in the circuit.

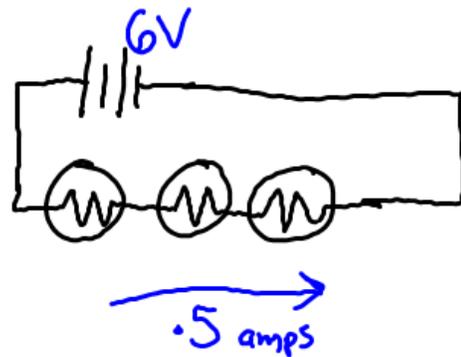
$$R = \frac{V}{I} = \frac{6}{.5} = 12 \Omega$$

c. What is the individual resistance in each resistor?

$$\frac{12 \Omega}{3} = 4 \Omega$$

d. Calculate the voltage drop across EACH resistor.

$$V = IR = (.5)(4) = 2 \text{ volts}$$



30. Use the drawing to the right to answer the following questions.

a. What is the voltage passing through each branch? 12 v

$$\frac{1}{R} = \frac{1}{3} + \frac{1}{2} + \frac{1}{4}$$

$$= \frac{4}{12} + \frac{6}{12} + \frac{3}{12}$$

$$= \frac{13}{12}$$

$$R = \frac{12 \Omega}{13} \rightarrow I = 12 \left(\frac{13}{12} \right) = 13 \text{ amp}$$

$$12 \text{ v}$$



b. What is the current passing through each branch?

at 3 ohms, $I = 12/3 = 4 \text{ Amps}$

at 2 ohms $I = 12/2 = 6 \text{ amps}$

at 4 ohms $I = 12/4 = 3 \text{ amps}$