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4. What is an ampere?
   Ask and correctly answer this one in class for plus 2 points.

7. How much energy is supplied to each coulomb of charge that flows through a 12-Volt battery?
   **Ans.** Since Voltage is the amount of energy in joules per coulomb of charge, 12 Volts will yield 12 joules of energy per coulomb of charge.

11. If the resistance in a circuit is doubled while the voltage is kept constant, what happens to the current?
   **Ans.** We can see from Ohm's law (I = V/R) that the current I is inversely proportional to the resistance R. Therefore, if the resistance is doubled while the voltage is kept constant, the current will be 1/2 of its original value.

12. If the resistance of a circuit remains constant while the voltage across the circuit is changed to 1/2 of its original value, what happens to the current?
   **Ans.** From Ohm's law (I = V/R) we see that current is directly proportional to voltage. Cutting the voltage in half will cut the current in half.

13. How does water moisture on your skin affect your skin's electrical resistance?
   **Ans.** Your skin's resistance goes down as it becomes more moist.

14. For a given voltage, what happens to the amount of current that flows in your skin when you perspire?
   Ask and answer this one correctly in class for plus 2 points.

17. Distinguish between dc and ac.
   Ask and answer this one correctly in class for plus 2 points.

19. What does it mean to say that a certain current is 60 HZ?
   **Ans.** It means that the current is changing direction at a rate of 60 complete cycles per second. This is an example of alternating current which is abbreviated AC.

27. When you pay your household electric bill, which of the following are you paying for: voltage, current, power or energy?
   **Ans.** You are billed for a certain number of kilowatt hrs. Kilowatts are units of power. Power times time = Energy.
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29. What is the relationship between electrical power, current and voltage?
   **Ans.** The relationship is given by \( P = IV \):
   We can see that power is directly proportional to the current \( I \), as well as the voltage \( V \).
   If the current is measured in amps and the voltage is in volts, then the power will be in watts.

30. Which of these is a unit of power and which is a unit of energy: a watt; a kilowatt; a kilowatt-hour?
   **Ans.** Watts and kilowatts are units of power.
   Kilowatt-hour is a unit of energy. Looking at the equation for power:
   Power = Energy/time
   If you multiply power by time, you are left with energy.
   \[
   \text{Power(time)} = \frac{\text{Energy}}{\text{time}} = \text{Energy}
   \]

33. In a circuit of two lamps in series, if the current through one lamp is 1 amp, what is the current through the other lamp?
   **Ans.** Since resistors in series all have exactly the same current through them, the current is the same for both lamps.

   **Extra:** What role do resistors normally play in an electric circuit?
   **Ans.** Resistors are used to regulate the amount of current and therefore the power in various parts of an electrical circuit. When you turn the volume up on your radio, you are actually decreasing the resistance and increasing the current in the portion of the circuit that produces the sound.
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5. What happens to the brightness of light emitted by a light bulb when the current that flows in it increases?
   **Ans.** Since the power in a devise is proportional to the current, \( P = IV \), the larger the current, the brighter the bulb.

8. Your tutor tells you that an ampere and a volt are the same thing. Are they?
   **Ans.** No. An amp is a measure of the charge per unit time that flow through a devise. Voltage is the amount of energy per unit charge. They are related but are very different things.

18. Only a small percentage of the electric energy fed into a common light bulb is transformed into visible light. What happens to the rest?
   **Ans.** It comes off as invisible light in the infra-red part of the spectrum.

23. What is the effect on current in a wire if both the voltage across it and the resistance are doubled? Both halved?
   **Ans.** The current remains unchanged. \( I = \frac{V}{R} \) baby.

24. Will the current in a light bulb connected to a 220-V source be greater or less than when the same bulb is connected to 110-V source?
   **Ans.** Greater. Current is directly proportional to Voltage. \( I = \frac{V}{R} \)

27. Would you expect to find dc or ac in the filament of a light bulb in your home? How about in the headlight of an automobile?
   **Ans.** AC in your home and DC in your car.

28. Are your car headlights wired in parallel or series.
   **Ans.** Parallel. When one bulb burns out the other keeps on shining.

30. What unit is represented by:
   a) joule/coulomb = Volt
   b) coulomb/sec = Amp
   c) watt•sec = joule

31. To connect a pair of resistors so that their combined resistance will be greater than the resistance of either one, should they be connected in series or parallel?
   **Ans.** Series
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2.  Rearrange the equation \( I = \frac{V}{R} \) to express resistance in terms of current and voltage. The
solve the following: A certain device in a 120-V circuit has a current rating of 20 amps. What is
the resistance of the device?
\[
\text{Ans.} \quad R = \frac{V}{I} = \frac{120 \, \text{volts}}{20 \, \text{amps}} = 6 \, \text{ohms}
\]

Extra: Solve the formula \( P = IV \), for \( I \), and then find the current drawn by a 1200-watt hair dryer
connected to 120-volt source. Then using Ohm's law, find the resistance of the hair dryer.
\[
\text{Ans.} \quad \text{Since } P = IV \text{ then } \frac{P}{V} = I. \text{ Therefore the current } I = \frac{1200\, \text{W}}{120\, \text{V}} = 10\, \text{amps}
\]
\[
\text{The resistance } R = \frac{V}{I} \text{ therefore } R = \frac{120\, \text{V}}{10\, \text{A}} = 12\, \text{ohms}
\]

4. The total charge that an automobile battery can supply without being recharged is given
in terms of ampere-hours. A typical 12-V battery has a rating of 60 ampere-hours. Suppose you
forget to turn off the headlights in your parked car. If each of the two headlights draws 3 amps,
how long will it be before your battery is "dead"?
\[
\text{Ans.} \quad I = \frac{q}{t}; \text{ therefore } t = \frac{q}{I} = \frac{60\, \text{amp} \cdot \text{hrs}}{6\, \text{amps}} = 10\, \text{hrs}
\]