

Physics 12

Assignment #4

Due Thursday, March 22nd, 2018

Multiple Choice

1. A solar powered calculator has 8.0C of charge pass through it in 4 hours. Determine the amount of current put out by the solar cells in milliamperes.
a) 2A b) 2mA c) 0.56mA d) 56mA
2. The filament in a light is made of tungsten and has a resistance of 6.96mΩ. The filament is 4.00cm long but is coiled to save space. What is its gauge of the wire?
a) 14 b) 18 c) 10 d) 22
3. What would the resistance be if you cut the length of the resistor in question 2 in half?
a) 3.48mΩ b) 13.92mΩ c) 1.74mΩ d) 27.84mΩ
4. What would happen to the resistance if you cut the diameter of the resistor in question 2 in half?
a) 3.48mΩ b) 13.92mΩ c) 1.74mΩ d) 27.84mΩ
5. A light bulb is rated at 100W in the United States, where the standard wall outlet voltage is 120V. If the bulb were plugged in in Europe, which of the following would be true?
a) the bulb would be one quarter as bright b) the bulb would be one-half as bright
c) the bulb's brightness would be the same d) the bulb's brightness would be twice as bright
e) the bulb would be four times as bright

Problems

6. A school year is about 185 teaching days. You can assume the lights in my classroom are on from 8:30am to 4:00pm. All of the bulbs are 16W and I try to only switch the back set of lights on. Determine the following:
 - a. How much energy I use on average in one school day in kWh.
 - b. How much does it cost to have the lights on everyday of the school year (No weekends, or holidays)?
 - c. The old bulbs used to be 34W. How much energy and money was saved by switching from 34W bulbs to 16W bulbs in one year?
7. An 8 gauge copper conductor that is 10 feet long needs to be replaced by a 40 foot cable. Determine the required gauge wire to replace it without increasing the resistance. (You may have to look up the gauge)
8. The battery in your car generates 14.5V while it is running. Your radio when turned up to 9 is using 200W of power. The fuse is a 15A fuse. The horn draws 2A when it honks. What happens? Support your answer mathematically.
9. Why is important to change the gauge of a wire if you need to have a longer wire? Would you increase or decrease the gauge? Support your answer.

Practice Problems

10. Is it scientifically correct to say we buy power from the power company? Support your answer.
11. Why was Alessandro Volta's creation so important?
12. How much electrical charge was moved when a 30V battery does 2.5J of work? (83.3mC)

13. Your house operates at 120V. A small space heater draws a maximum current load of 10A. If it is operated at 75% capacity for 30 minutes how much electrical energy did the heater convert to heat energy? (1.62MJ)
14. The battery for a cordless drill draws 4500 C of charge for 45 minutes while recharging. What is the amount of current drawn while recharging? (1.67A)
15. A copper wired extension cord has a length of 15m and a resistance of 0.1221 Ω . What gauge is the wire? (14 gauge)
16. How much current is drawn when you operate a 5000W clothes dryer in your house? Remember dryers use the big plug! (20.83A)
17. The filament in a floodlight is rated at 576W. If the resistance of the filament of the in the bulb is 25 Ω what continent was the bulb designed for? (North America)