Due date: Fri 08 Oct 2004 08:00:39 AM MDT

Hair dryer
A typical household circuit is capable of carrying 15.0 Amps of current at 120 V before the circuit breaker will trip. How many 1500-W hair dryers can run off one such circuit?

Computer's answer now shown above.
In the rush to get ready for lecture, a physics professor leaves the hair dryer described in the previous problem running and does not turn it off until getting home 8.0 hours later. How much will this add, in dollars, to the next electric bill (assume electricity costs \$0.078 per kilowatt-hr)? (Do not enter units)

Computer's answer now shown above.

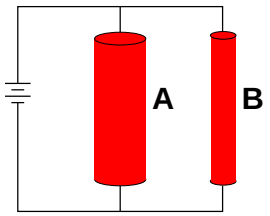
---

wire safety
A number 16 copper wire has a diameter of 1.291 mm, and a length of 31.0 m
For safety, the National Electrical Code limits the allowable amount of current which such a wire may carry. When used in indoor wiring, the limit is 6.0 A for insulated wire of this size. How much power would be dissipated in this wire when carrying the maximum allowable current?
(Use 1.72×10^{-8} Ωm for the resistivity of copper.)

Computer's answer now shown above.

Two Wires

The picture shows a battery connected to two wires in parallel. Both wires are made of the same material and are of the same length, but the diameter of wire A is twice the diameter of wire B.



Choices: **True**, **False**.

A. The voltage drop across wire B is larger than the voltage drop across wire A.
B. The resistance of wire B is twice as large as the resistance of wire A.
C. The power dissipated in wire A is 16 times the power dissipated in wire B.
D. The resistance of wire B is four times as large as the resistance of wire A.
E. The curent through the battery is five times larger than the current through wire B.

Computer's answer now shown above.

---

drift velocity
Assume that gold has one electron per atom to carry charge. Calculate the drift speed of the electrons in a gold wire that carries 7.00 A and has a circular cross section 0.90 mm in radius. (There is more information needed which is not given here, including e.g. the density and atomic weight ("molar mass") of gold. You can look up what you need in lots of places, including a handy appendix at the end of HRW!)

Computer's answer now shown above.

Car battery
A 12 Volt lead-acid car battery, engineered for "up to 500 or more charge/discharge cycles," has a rating of 330.0 Ampere*hours. It sells for \$262.00.

The battery has a mass of 32.7 kg. What total mass of such batteries would be required to deliver the same effective mechanical energy as 12.0 gallons of gasoline? Assume that the efficiency of an electrically powered car is 2.5 times that of a gasoline-powered car for the conversion to mechanical energy.
DATA: Energy content of 1 gallon of gas = 1.32×10^8 Joules.
Also note that "Ampere*hours" tells you a total amount of charge - it's the total charge Q which the battery can produce (at a steady 12 V) before needing recharging.

Computer's answer now shown above.
