Fields 25.1

A 2.0 m length of wire is made by welding the end of a 120 cm long silver wire to the end of an 80 cm long copper wire. Each piece of wire is 0.60 mm in diameter. The wire is at room temperature (resistivities are listed in Table 25.1 in the book). A potential difference of 5.0 V is maintained between the ends of the 2.0 m composite wire. a) What is the current in the copper section? b) What is the current in the silver section? c) What is the magnitude of the electric field in copper? d) What is the magnitude of the electric field in the silver? e) What is the potential difference across the silver section of the wire?

Fields 25.2

A 1.50 m long cylinder of radius 1.10 cm is made of a complicated mixture of materials. Its resistivity depends on the distance x from the left end and obeys the formula $\rho(x) = a + bx^2$, where a and b are constants. At the left end, the resistivity is $2.25 \times 10^{-8} \Omega \cdot m$, while at the right end it is $8.50 \times 10^{-8} \Omega \cdot m$. a) What is the resistance of this rod? b) What is the electric field at its midpoint if it carries 1.75 A of current? c) If we cut the rod into two 0.75 cm pieces, what is the resistance of each half?

Fields 25.3

Consider the circuit shown in the figure below. The battery has emf 62.0 V and negligible internal resistance. R_2 = 3.00 Ω, C_1 = 2.00 μF, and C_2 = 7.00 μF. After the capacitors have attained their final charges, the charge on C_1 is Q_1 = 18.0 μC. a) What is the final charge on C_2? b) What is the resistance R_1?