

50. (a) We denote the copper wire with subscript  $c$  and the aluminum wire with subscript  $a$ .

$$R = \rho_a \frac{L}{A} = \frac{(2.75 \times 10^{-8} \Omega \cdot \text{m})(1.3 \text{ m})}{(5.2 \times 10^{-3} \text{ m})^2} = 1.3 \times 10^{-3} \Omega .$$

- (b) Let  $R = \rho_c L / (\pi d^2 / 4)$  and solve for the diameter  $d$  of the copper wire:

$$d = \sqrt{\frac{4\rho_c L}{\pi R}} = \sqrt{\frac{4(1.69 \times 10^{-8} \Omega \cdot \text{m})(1.3 \text{ m})}{\pi(1.3 \times 10^{-3} \Omega)}} = 4.6 \times 10^{-3} \text{ m} .$$