

26A

A high-voltage transmission line with a diameter of 2.00 cm and a length of 200 km carries a steady current of 1 000 A. If the conductor is copper wire with a free charge density of 8.46×10^{28} electrons/m³, over what time interval does one electron travel the full length of the line?

26B

An all-electric car (not a hybrid) is designed to run from a bank of 12.0-V batteries with total energy storage of 2.00×10^7 J. (a) If the electric motor draws 8.00 kW, what is the current delivered to the motor? (b) If the electric motor draws 8.00 kW as the car moves at a steady speed of 20.0 m/s, how far can the car travel before it is “out of juice”?

26C

A spherical shell with inner radius r_a and outer radius r_b is formed from a material of resistivity ρ . It carries current radially, with uniform density in all directions. Show that its resistance is

$$R = \frac{\rho}{4\pi} \left(\frac{1}{r_a} - \frac{1}{r_b} \right)$$