

66. (a) The magnitude of the magnetic field at the center of the loop, using Eq. 30-11, is

$$B = \frac{\mu_0 i}{2R} = \frac{(4\pi \times 10^{-7} \text{ H/m}) (100 \text{ A})}{2(50 \times 10^{-3} \text{ m})} = 1.3 \times 10^{-3} \text{ T} .$$

- (b) The energy per unit volume in the immediate vicinity of the center of the loop is

$$u_B = \frac{B^2}{2\mu_0} = \frac{(1.3 \times 10^{-3} \text{ T})^2}{2(4\pi \times 10^{-7} \text{ H/m})} = 0.63 \text{ J/m}^3 .$$