

51. (a) The area of the loop is $A = \frac{1}{2}(30 \text{ cm})(40 \text{ cm}) = 6.0 \times 10^2 \text{ cm}^2$, so

$$\mu = iA = (5.0 \text{ A}) (6.0 \times 10^{-2} \text{ m}^2) = 0.30 \text{ A}\cdot\text{m}^2 .$$

- (b) The torque on the loop is

$$\tau = \mu B \sin \theta = (0.30 \text{ A}\cdot\text{m}^2) (80 \times 10^3 \text{ T}) \sin 90^\circ = 2.4 \times 10^{-2} \text{ N}\cdot\text{m} .$$