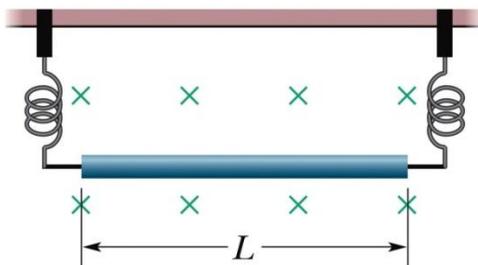


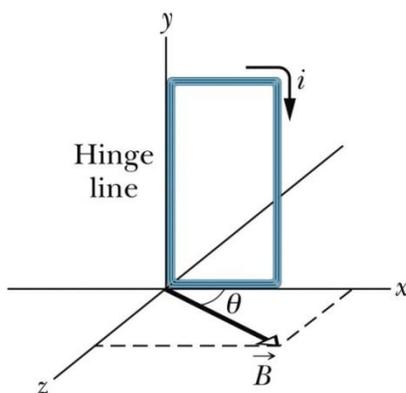
Interactive Problem Set 22, SP212 Spring 2013

Topic: Magnetic Forces and Magnetic Dipole Moment

1. A 13.0 g wire of length $L = 62.0$ cm is suspended by a pair of flexible leads in a uniform magnetic field of magnitude 0.440 T. What are the (a) magnitude and (b) direction (left or right) of the current required to remove the tension in the supporting leads?



2. The figure below shows a rectangular 20-turn coil of wire, of dimensions 10 cm by 5.0 cm. It carries a current of 0.10 A and is hinged along one long side. It is mounted in the xy plane, at angle $\vartheta = 30^\circ$ to the direction of a uniform magnetic field of magnitude 0.50 T. In unit-vector notation, what is the torque acting on the coil about the hinge line?



3. A circular coil of 160 turns has a radius of 1.90 cm.
- Calculate the current that results in a magnetic dipole moment of magnitude $2.30 \text{ A} \cdot \text{m}^2$.
 - Find the maximum magnitude of the torque that the coil, carrying this current, can experience in a uniform 35.0 mT magnetic field.
 - An external agent rotates the dipole from its highest energy state to its lowest energy state in the same uniform magnetic field. Find the work done on the dipole by the external agent.

