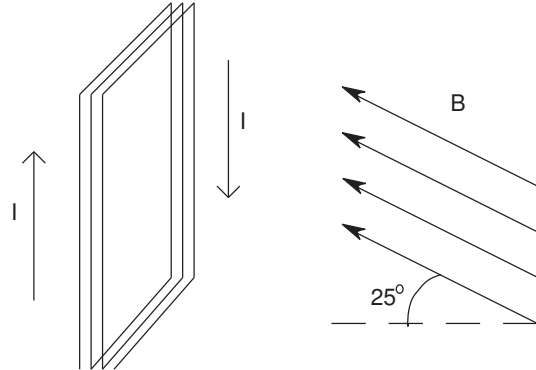


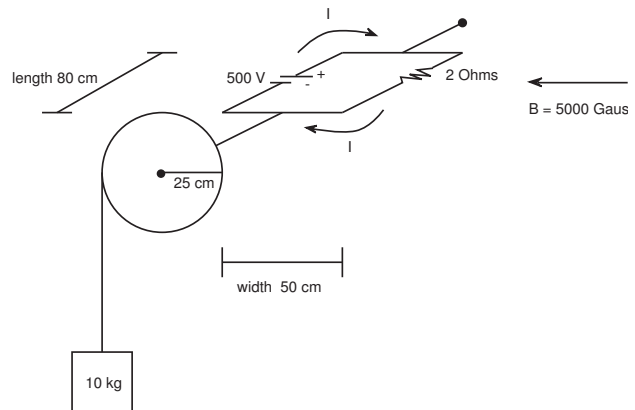
Name: _____

Homework on Current Loops in Magnetic Fields

1. A rectangular loop of 10 turns with width 35 cm and length 60 cm carrying a current of 3.4 A is in a magnetic field of 2800 Gauss angled as shown in the diagram to the right. Find the magnitude of the torque on the loop and indicate the direction of the torque vector.



2. A 10 kg weight is hung from a frictionless, massless pulley as shown. Attached to the axis of the pulley is a massless circuit with a resistance of 2 ohms and a battery producing 500 V of EMF as shown. A uniform magnetic field of 5000 Gauss points to the left.



- Find the magnitude and direction of the magnetic moment of the loop.
- Find the magnitude and direction of the magnetic torque on the loop. Also find the gravitational torque from the hanging mass.
- When the loop rotates to the upright position, how much magnetic potential energy is lost? How much gravitational potential energy is gained?
- What is the kinetic energy of the block? What velocity of the block? What is the angular velocity of the current loop?
- Suppose it was possible to switch the direction of the EMF source on the circuit. How could one time the switching so that the apparatus would continue to rotate and lift the mass?