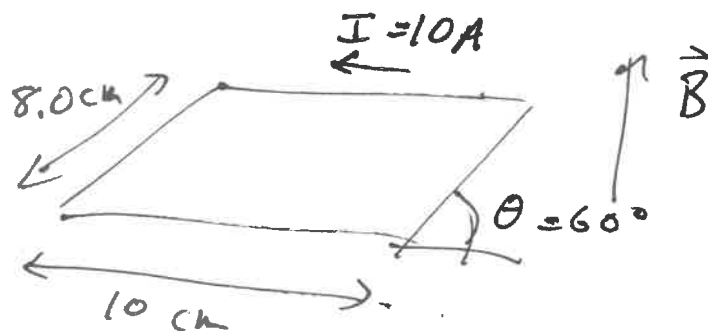


Ch. 11 Prob. 83

Find the net force and net torque on the loop.



a) Net Force

since the loop is closed and the B-field uniform,

then  $F_{\text{loop}} = 0 \text{ N}$

b) Net Torque

The loop + B field lie in the plane of the paper. (Make +x to the right + y upward)

Then +z is out of the page

Then  $\vec{B} = 1.5 \text{ T } \hat{j}$  towards you.)

and  $\vec{A} = A \hat{k}$  (current goes around the loop counter-clockwise)

Now A is a parallelogram and

$$A = l \cdot w \cdot \sin \theta = (0.10 \text{ m})(0.080 \text{ m}) \sin 60^\circ$$

$$A = 6.93 \times 10^{-3} \text{ m}^2$$

$$\vec{\tau} = I \vec{A} \times \vec{B} = (10 \text{ A}) \left[ (6.93 \times 10^{-3} \text{ m}^2 \hat{k}) \times (1.5 \text{ T } \hat{j}) \right]$$

$$= 0.104 (\hat{k} \times \hat{j}) \text{ N}\cdot\text{m}$$

$$\vec{\tau} = -0.104 \hat{i} \text{ N}\cdot\text{m}$$

(Textbook answer is incorrect)