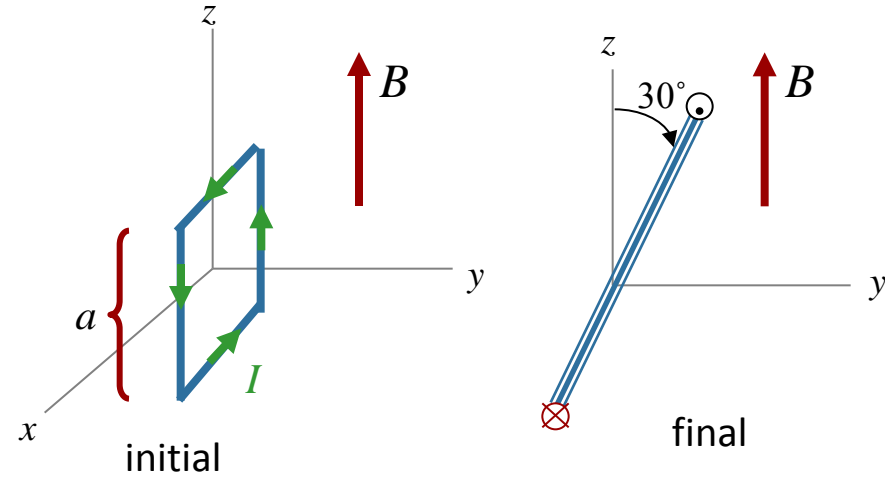


# Calculation

A square loop of side  $a$  lies in the  $x$ - $z$  plane with current  $I$  as shown. The loop can rotate about  $x$  axis without friction. A uniform field  $B$  points along the  $+z$  axis. Assume  $a$ ,  $I$ , and  $B$  are known.

How much does the potential energy of the system change as the coil moves from its initial position to its final position.



## Conceptual Analysis

A current loop may experience a torque in a constant magnetic field

$$\tau = \mu \times B$$

We can associate a potential energy with the orientation of loop

$$U = -\mu \cdot B$$

## Strategic Analysis

Find  $\mu$

Calculate the change in potential energy from initial to final