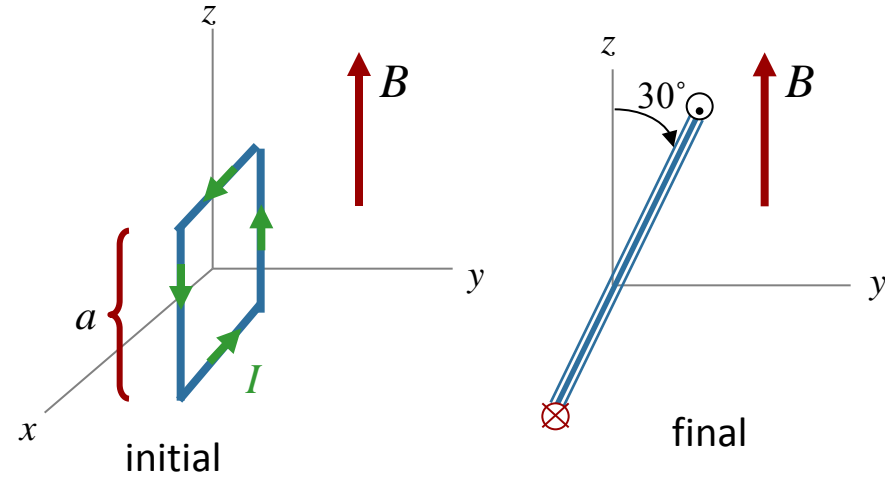


# Calculation

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.

$$U = -\vec{\mu} \cdot \vec{B}$$

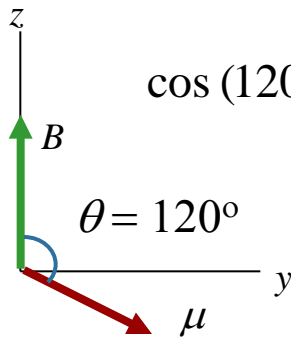


What is the potential energy of the final state?

A)  $U = Ia^2B$

B)  $U = \frac{\sqrt{3}}{2} Ia^2B$

C)  $U = \frac{1}{2} Ia^2B$



$$\cos(120^\circ) = -\frac{1}{2}$$

$$\rightarrow U = -\vec{\mu} \cdot \vec{B} = -\mu B \cos(120^\circ) = \frac{1}{2} \mu B$$

$$\mu = Ia^2$$

$$\rightarrow U = \frac{1}{2} Ia^2B$$