Example Problem
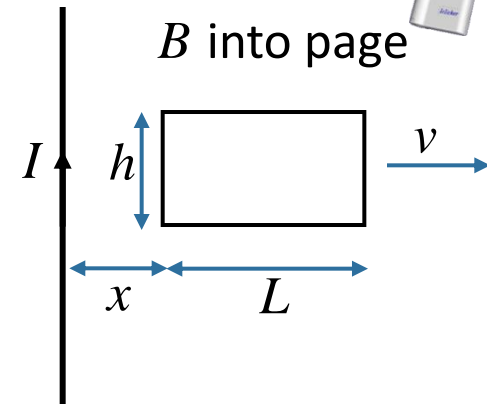
A rectangular loop $(h = 0.3m\ L = 1.2\ m)$ with total resistance of 5Ω is moving away from a long straight wire carrying total current $8\ \mathrm{amps}$. What is the induced current in the loop when it is a distance $x = 0.7\ m$ from the wire?

B into page

I h v

x L

Which expression represents the total *emf* in the loop?

A) $\varepsilon_{loop} = \dfrac{\mu_o I}{2\pi x} hv + \dfrac{\mu_o I}{2\pi(L+x)} hv$

B) $\varepsilon_{loop} = \dfrac{\mu_o I}{2\pi x} hv - \dfrac{\mu_o I}{2\pi(L+x)} hv$

C) $\varepsilon_{loop} = 0$

$$I_{loop} = \frac{\varepsilon_{loop}}{R}$$

$$I_{loop} = \frac{\mu_o I}{2\pi R} hv \left(\frac{1}{x} - \frac{1}{L+x} \right)$$