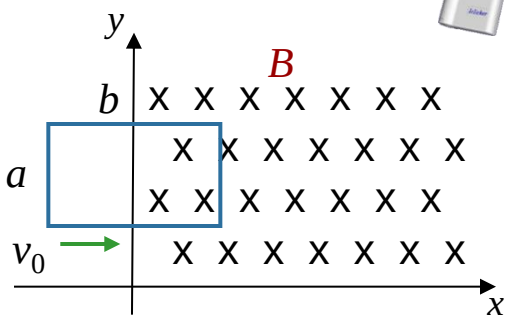
Calculation

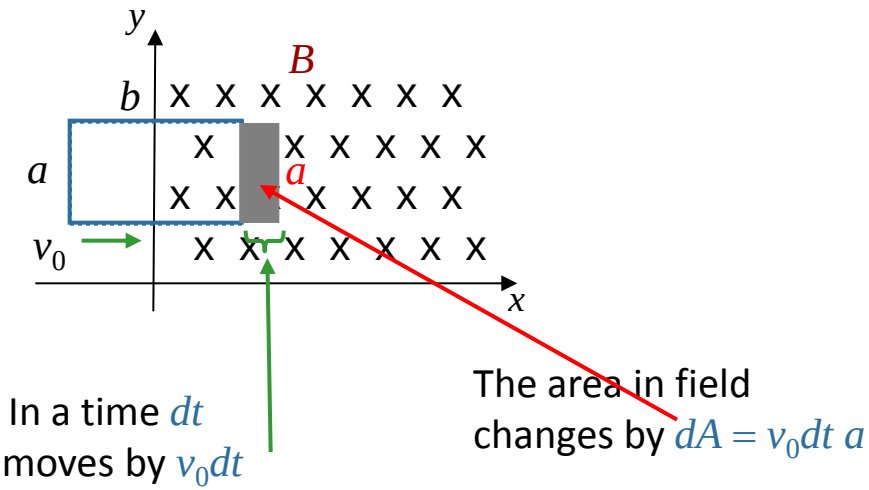
A rectangular loop (height = a, length = b, resistance = R, mass = m) coasts with a constant velocity v_0 in $+x$ direction as shown. At $t = 0$, the loop enters a region of constant magnetic field B directed in the $-z$ direction.



What is the magnitude of the emf induced in the loop just after it enters the field?

$$emf = -\frac{d\Phi_B}{dt}$$

A) $\varepsilon = Babv_0^2$ B) $\varepsilon = \frac{1}{2} Bav_0$ C) $\varepsilon = \frac{1}{2} Bbv_0$ **D) $\varepsilon = Bav_0$** E) $\varepsilon = Bbv_0$



→ Change in Flux $= d\Phi_B = BdA = Bav_0 dt$

→ $\frac{d\Phi_B}{dt} = Bav_o$