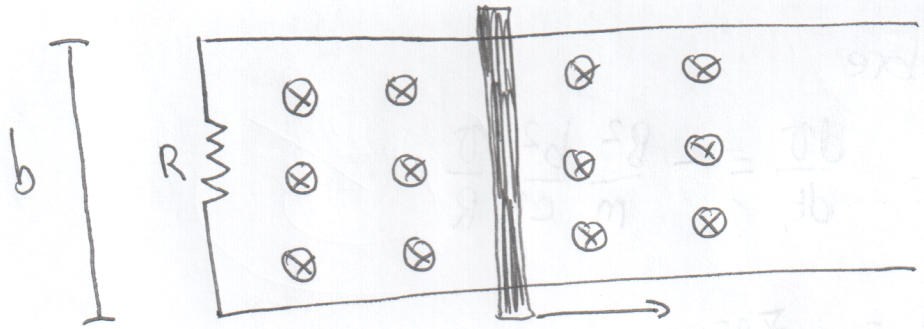
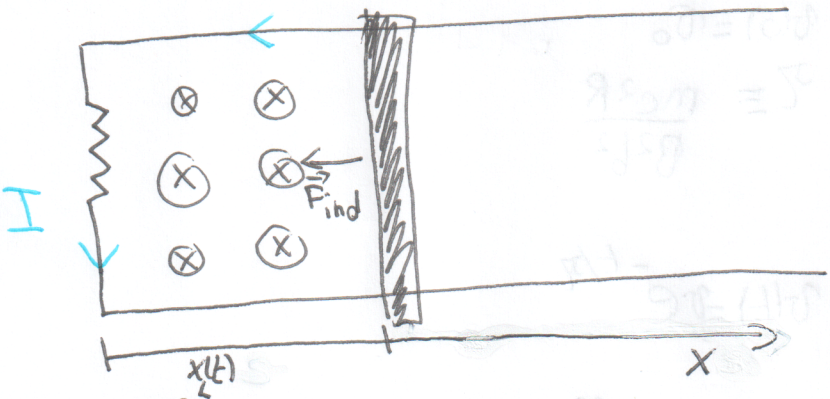
2)





a) • Faraday's Law

$$\begin{cases} \mathcal{E} = -\frac{1}{C}\frac{\partial \Phi_B}{\partial t} \\ \Phi_B(t) = B b x_L(t) \end{cases}$$

$$\mathcal{E} = -\frac{1}{C} B b \frac{dx_L}{dt} = -\frac{1}{C} B b v$$

• Lenz's Law: the induced current flows in the direction that counteracts the change of the flux i.e., it flows counterclockwise

• The magnetic force on the bar is opposite to the direction of motion.

By Ohm's Law $I_{ind}(t) = \frac{\mathcal{E}(t)}{R} = -\frac{1}{R_C} B b v$

$$\vec{F}_{ind} = -\frac{1}{R_C^2} B^2 b^2 v \hat{x} = m\vec{a} = m\frac{d\vec{v}}{dt}$$

Force on a straight wire $\vec{F} = \frac{I}{C}\vec{L} \times \vec{B}$ → Newton's second Law