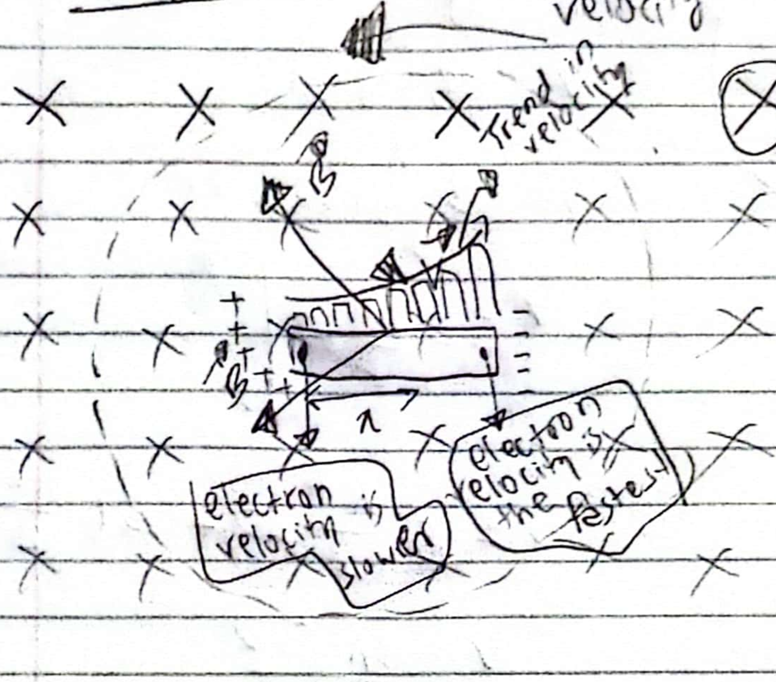
Motional emf part 1

example

ω : angular velocity



$\otimes$ $\vec{B}$ away from the eye

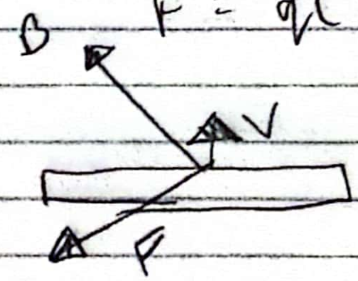
motional emf

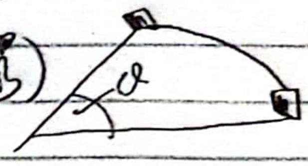
$$\mathcal{E} = B L V$$

B → magnetic field, L → length, V → velocity

When the rod moves at an angular velocity, the electrons inside the rod experiences a force [lorentz factor]

$$\vec{F} = q(\vec{v} \times \vec{B})$$





$$\frac{S}{t} = \frac{R\theta}{t}$$

$$v = R\omega$$

V [depends on x]

→ $dV = B\vec{v} \times dx$

$$V = \int_0^L B v \, dx$$

$$V = B \int_0^L v \, dx \qquad B \int_0^L [R\omega] \, dx$$

$$V = B \left[\frac{1}{2} x^2 \omega \right]_0^L$$

$$\boxed{= \frac{B \omega L^2}{2}} \text{ induced}$$