FARADAY'S LAW FOR A COIL

$$\mathcal{E} = -\frac{d\Phi_B}{dt}$$

for one loop

$$\mathcal{E} = -N\frac{d\Phi_B}{dt}$$

for a loop of N coils

WAYS TO CAUSE Φ_B

1. Move bar magnet.
2. Use electromagnet with AC.

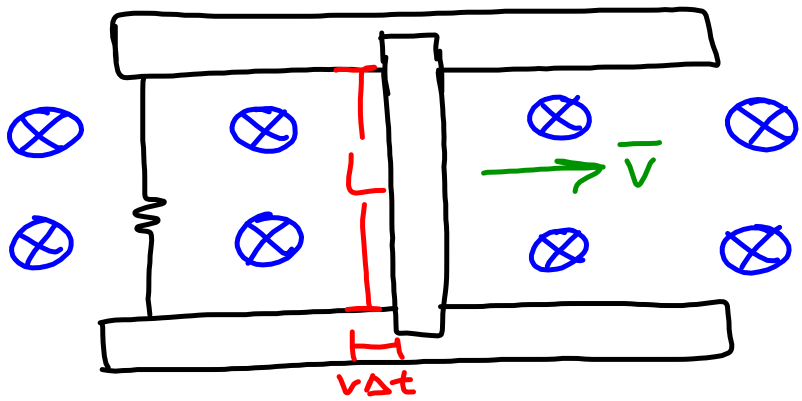
$$\overline{F} = q\overline{E} + \underbrace{q\overline{v} \times \overline{B}}_{\text{something has to be moving}}$$

1. Find B_1 at location of coil 2

2. $$\Phi_{B2} = \oint \bar{B} \cdot d\bar{A}$$
$$= |\bar{B}|\,|\bar{A}_2| \cos\theta$$

3. $$\mathcal{E} = N_2 \left| \frac{d\Phi_{B2}}{dt} \right|$$

FARADAY'S LAW AND MOTIONAL EMF



$$\Delta \Phi_B = B_\perp \Delta A = B(L v \Delta t)$$

$$\frac{\Delta \Phi_B}{\Delta t} = B L v$$

$$\mathcal{E} = -\left| \frac{d\Phi_B}{dt} \right|$$

sign comes from direction of magneti force

Two Pieces of Flux Derivative

$$\frac{d\Phi_B}{dt} = \frac{d}{dt}(B_\perp A)$$

$$= \underbrace{B_\perp \frac{dA}{dt}}_{\text{Faraday's Law}} + \underbrace{A \frac{dB_\perp}{dt}}_{\text{Motional Emf part}}$$

HW: P12, P15, P32