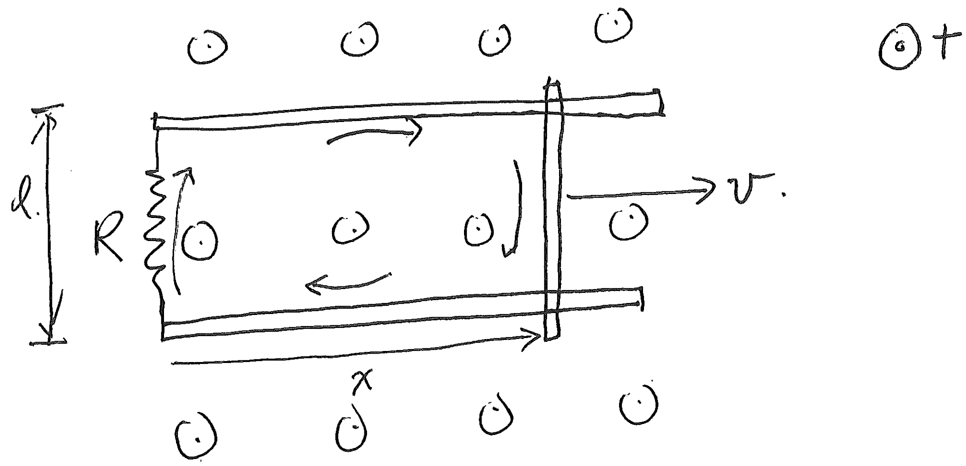


$$\Phi = +Bl x$$

Faraday's Law.

$$\mathcal{E} = -\frac{d\Phi}{dt} = -\frac{d\,Blx}{dt}$$

$$= -Bl\frac{dx}{dt}$$

$$= -Blv = \oint E\cdot dl$$

Changing B will induce Emf.

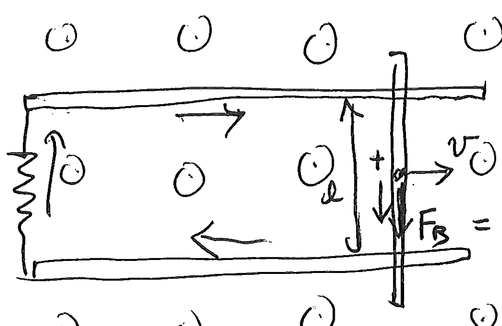
↑

Maxwell's 4th Eq.

Changing A will induce Emf.

↑

$F = q\vec{v}\times\vec{B}$.



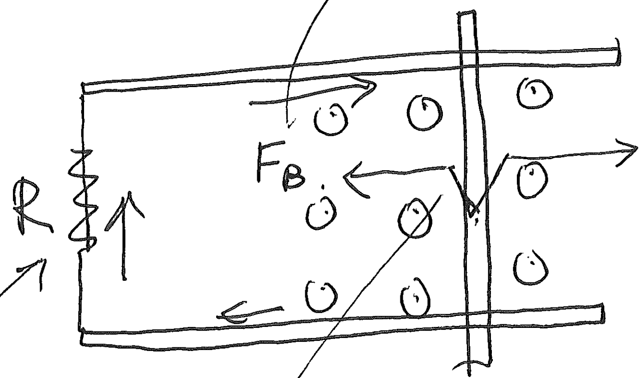
$F_B = qvB$.

$W = qvBl$.

$\mathcal{E}mf = -\frac{W}{q} = -Bvl$.

$$I = \frac{Blv}{R}$$

$$F_B = I l B = \frac{B^2 l^2 v}{R}.$$



⊗ Induced B field.

$$F = \frac{B^2 l^2 v}{R}$$

$(F = F_B)$.

Power of Force

$$= F v.$$

$$= \frac{B^2 l^2 v^2}{R}.$$

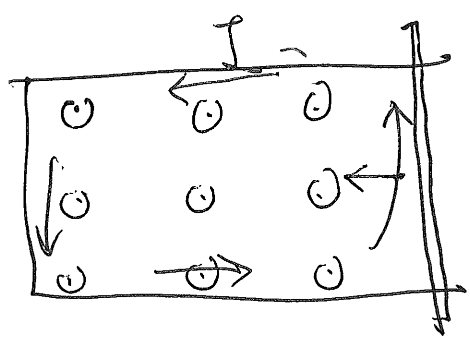
$$I = \frac{B l v}{R}.$$

Power dissipated in R

$$= I^2 R.$$

$$= \left(\frac{B l v}{R}\right)^2 \cdot R$$

$$= \frac{B^2 l^2 v^2}{R}.$$

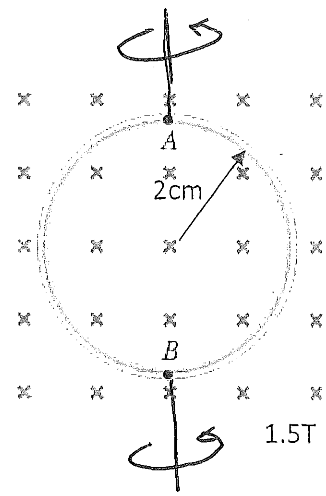


⊙ Induce B field.

Name: ____________________

PHY 232 Summer 2016 Class Work

Class 32 . More Faraday's Law



Consider a 100 turns circular loop (2cm in radius) placed in a uniform field of 1.5T as shown in the diagram, at t=0. Calculate the induced emf (magnitude only) in the following cases:

(a) The field is increased from 1.5T to 3T in 0.5s.

(b) The loop is grasped at points *A* and *B* and stretched until its area is nearly zero in 0.1s.

(c) What is the emf as a function of t if the loop is rotating with bearing at A and B with an angular speed of 10 radian per second?