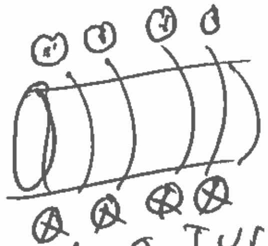
ex/



$N_{sol} = 100$ Turn

.25 m Long

$N_{coil} = 1$

$R = .10\,m$

Loop

$\theta = 0^\circ$

Between normal to loop and B_{sol}

i Go from $10A \to 5A$ in $2S$

# of Turns in object having $\mathcal{E}$ induced.

$$\mathcal{E} = -N \frac{\Delta \Phi_B}{\Delta t}$$

Lenz's Law $\Rightarrow$ induced B must oppose $\Delta \Phi_B$

$$\mathcal{E} = N_{loop} \frac{\Delta}{\Delta t}(B_{sol} A_{loop}) = \frac{N_{loop}}{\Delta t}\left[B_{F_{sol}} A_{loop} - B_{o_{sol}} A_{loop}\right]$$

$$\mathcal{E} = \frac{N_{loop} A_{loop}}{\Delta t}\left(B_{F_{sol}} - B_{o_{sol}}\right)$$

$$B_{sol} = \mu_0 n i_{sol} = \frac{\mu_0 N_{sol} i}{L_{sol}}$$

$$\mathcal{E} = \frac{N_{loop} A_{loop} \mu_0 N_{sol}}{\Delta t\, L_{sol}} \left(i_{sol_f} - i_{sol_0} \right)$$

$$\mathcal{E} = \frac{\mu_0 N_{loop} N_{sol} \pi R_{loop}^2}{\Delta t\, L_{sol}} \left(i_{sol_f} - i_{sol_0} \right)$$

$$\mathcal{E} = \frac{\pi \mu_0 N_{loop} N_{sol} R_{loop}^2}{\Delta t\, L_{sol}} \left(i_{sol_f} - i_{sol_0} \right)$$

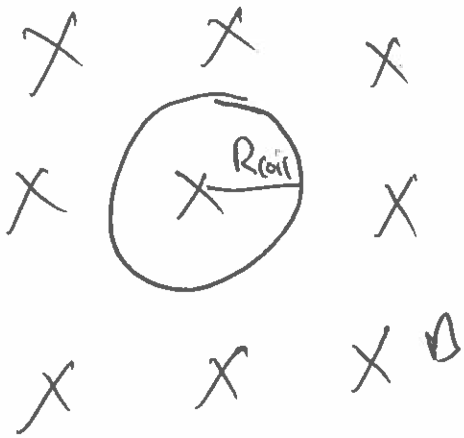
$$\mathcal{E} = \frac{\pi \left(4\pi \times 10^{-7} \frac{Tm}{A}\right)(1)(100)(.10m)^2}{(2s)(.25m)} \left(5A - 10A \right)$$

$$\boxed{\mathcal{E} = 3.95 \times 10^{-5}\ V}$$

$$i_{ind} = \frac{\mathcal{E}}{Res_{loop}}$$

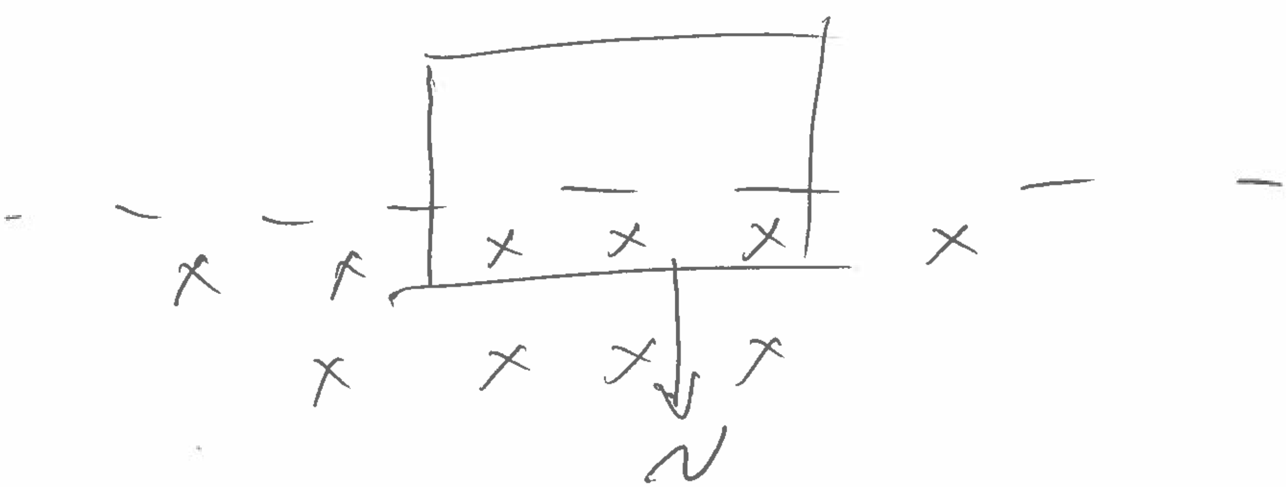
Calculating Magnetic flux

$$\Phi_B = \vec{B} \cdot \vec{A}$$



$$\Phi_B = B \underbrace{\pi R_{coil}^2}_{A_{coil}}$$

$$\Phi_B = B \underbrace{\pi R_B^2}_{A_B}$$



22-20

$$\mathcal{E} = -N\frac{\Delta\Phi}{\Delta t}$$

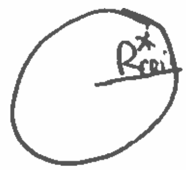
$$\mathcal{E}_{ind} = -N\frac{\Delta\Phi}{\Delta t} = -N\frac{\Delta(BA)}{\Delta t} = -NA\frac{\Delta B}{\Delta t}$$

$N \sim 1$ we want Δt

$$\Delta t = \frac{A\Delta B}{\mathcal{E}_{ind}}$$

$$\Delta t = \frac{(0.032m^2)(0 - 1.5T)}{(0.01V)} = \underline{4.80s}$$

22-28



$N_{coil} = 105$

$R^*_{coil} = 4.00 \times 10^{-2}\ m$

$R_{coil} = 0.480\ \Omega$

$\frac{\Delta B_{ext}}{\Delta t} = 0.783\ T/s$

$B_{ind} = ?$

$$B_{ind\ coil} = \frac{\mu_0 N_{coil}\, i_{coil}}{2 R^*_{coil}}$$

$$i_{coil} = \frac{\mathcal{E}}{R_{coil}} = \frac{-N\frac{\Delta \Phi_B}{\Delta t}}{R_{coil}} = \frac{N_{coil} A_{coil} \frac{\Delta B_{ext}}{\Delta t}}{R_{coil}}$$

~~$B_{ind\ coil} = \mu_0$~~

$$\mathcal{E}_{ind} = N_{coil}\, \pi R^{*2}_{coil} \frac{\Delta B_{ext}}{\Delta t}$$

$$\mathcal{E}_{ind} = (105)\pi (4.00 \times 10^{-2}\ m)^2 (.783\ T/s)$$

$$\mathcal{E}_{ind} = 0.4133\ V$$

$$i_{coil} = \frac{\mathcal{E}_{ind}}{R_{coil}} = \frac{0.4133\ V}{0.480\ \Omega} = 0.861\ A$$

$$B_{ind} = \frac{\mu_0 N_{coil}\, i_{coil}}{2 R^{*}_{coil}}$$

$$= \frac{\left(4\pi \times 10^{-7} \frac{Tm}{A}\right)(105)(.861\,A)}{2\left(4.00 \times 10^{-2}\,m\right)}$$

$$B_{ind} = 1.42 \times 10^{-3}\,T$$

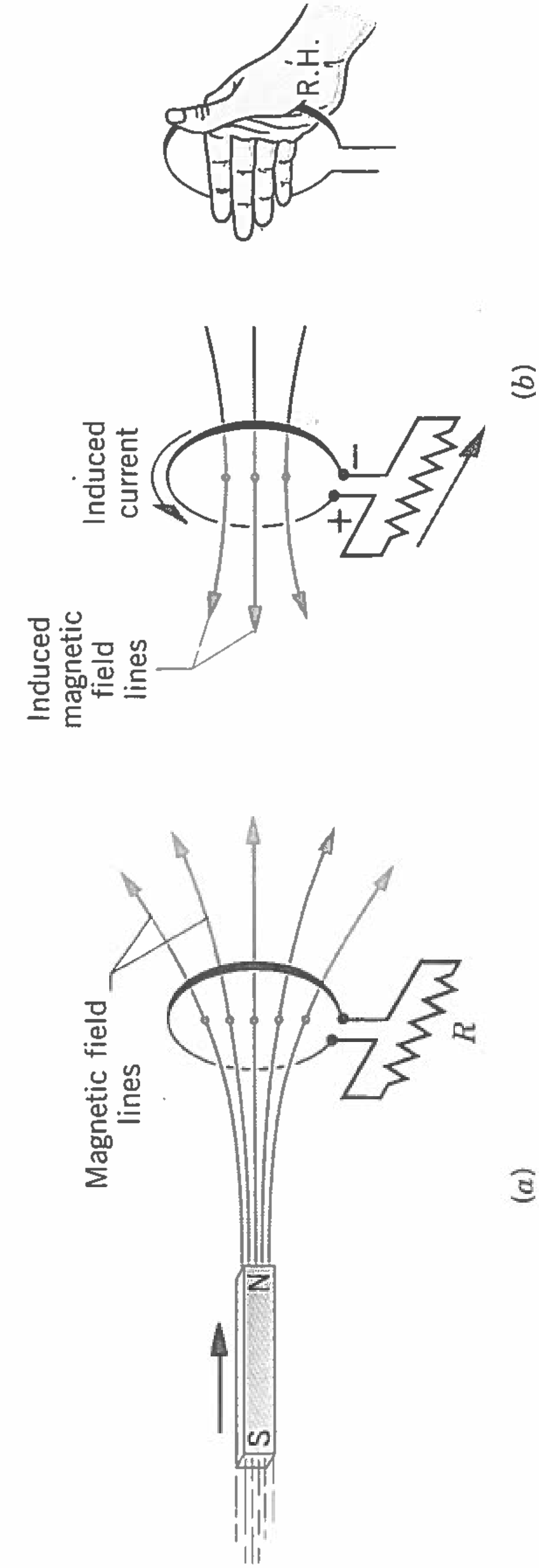


FIGURE 22.11 a, b

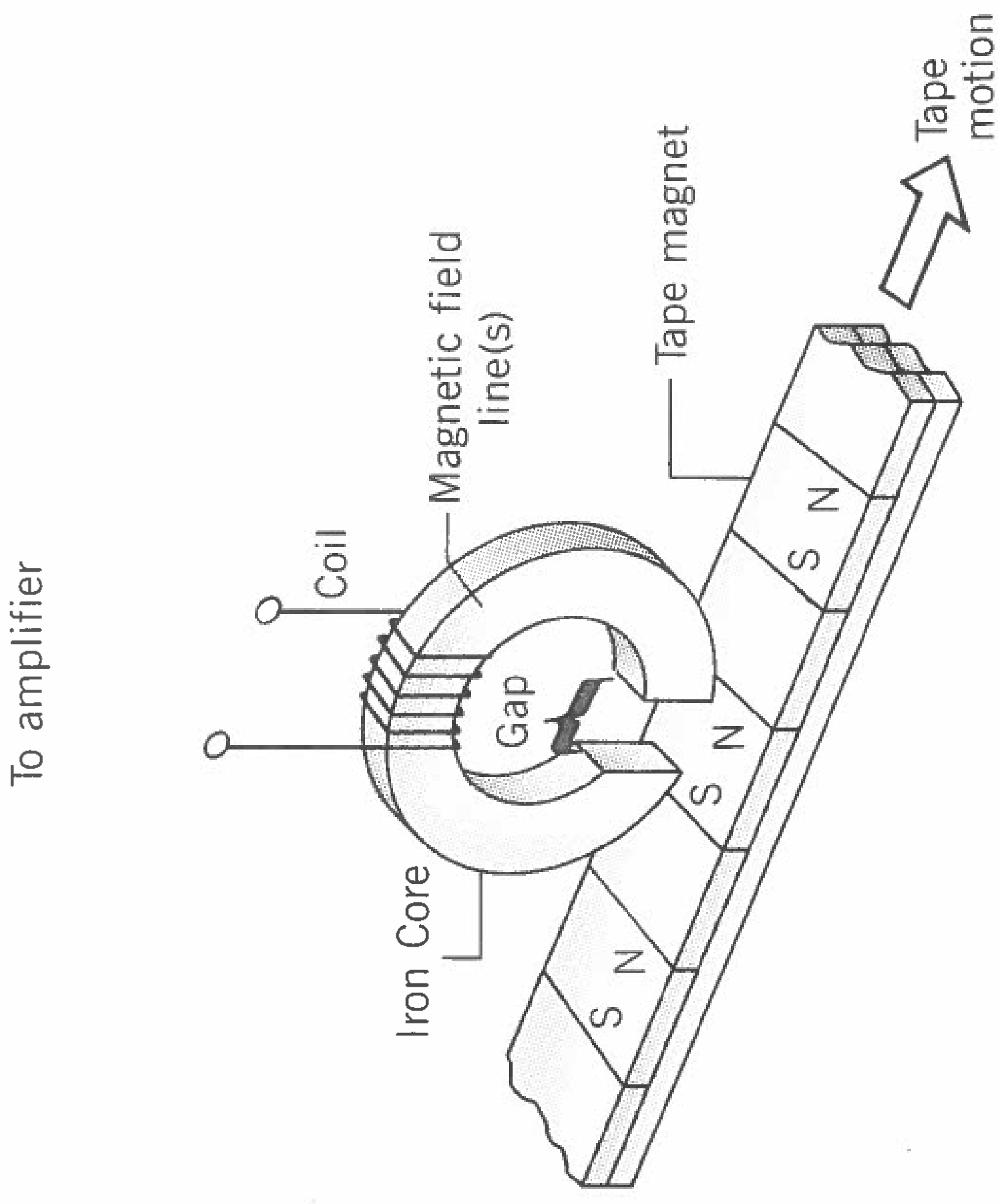

To amplifier
Coil
Magnetic field line(s)
Gap
Iron Core
Tape magnet
S
N
S
N
S
N
S
N
Tape motion

FIGURE 22.15

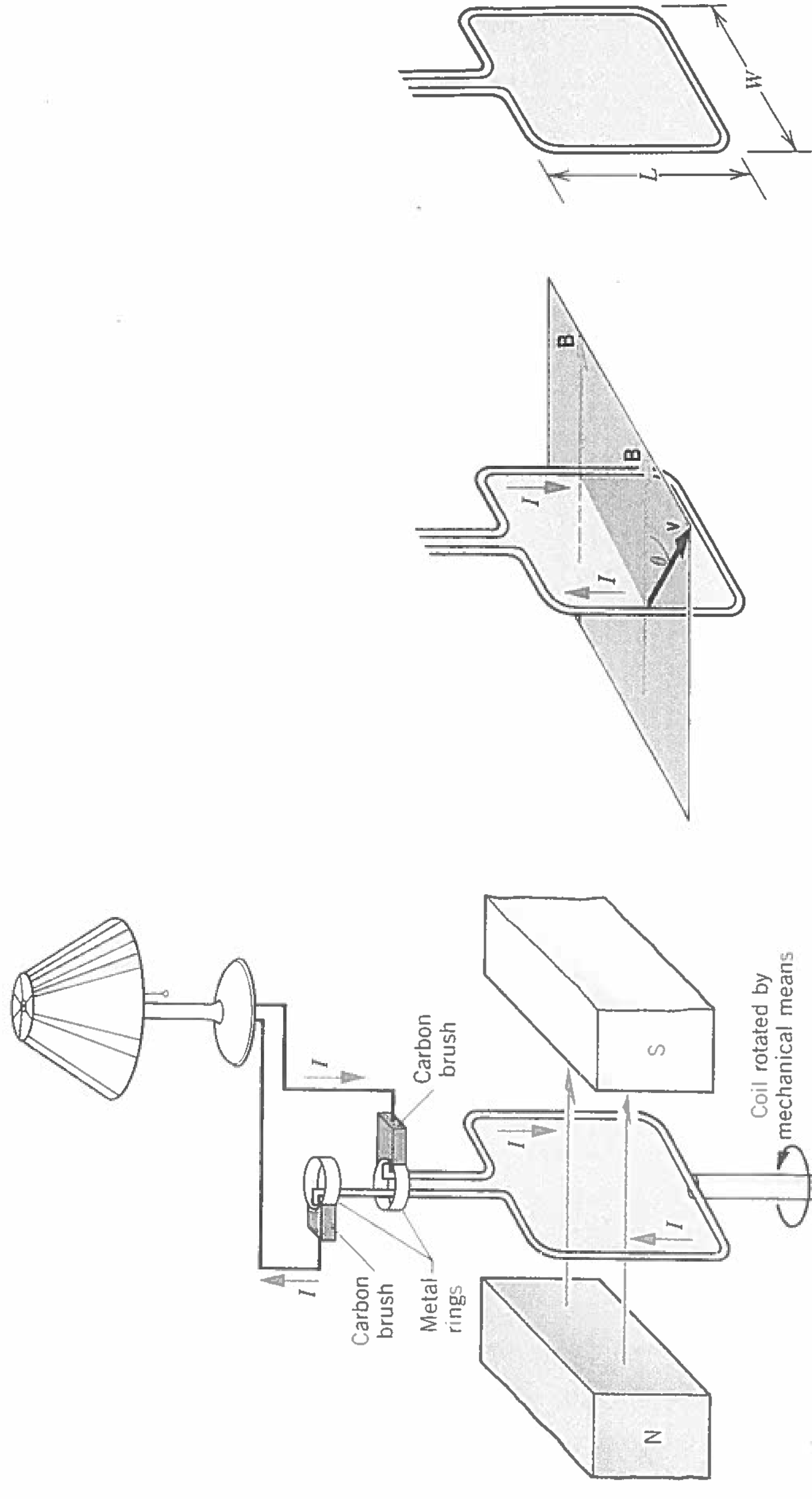
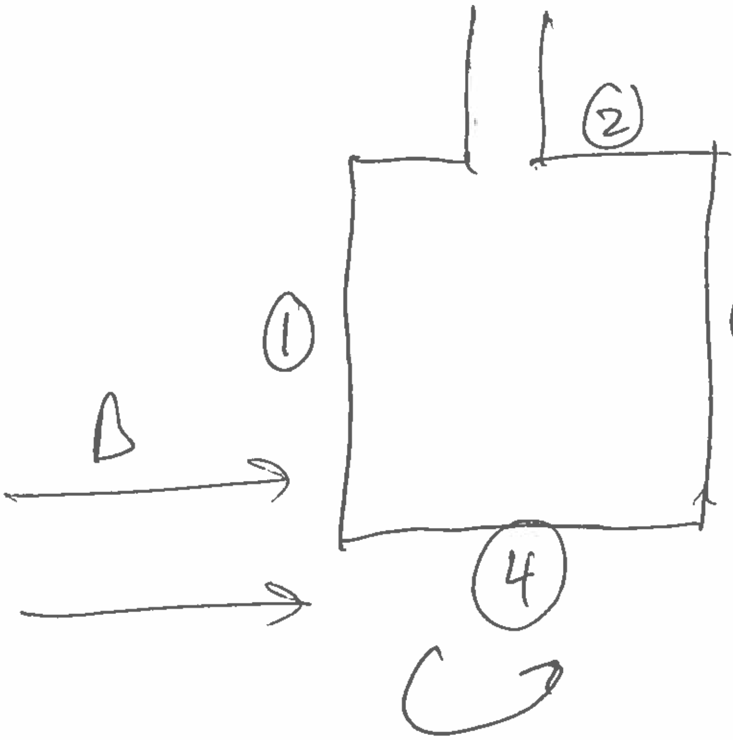
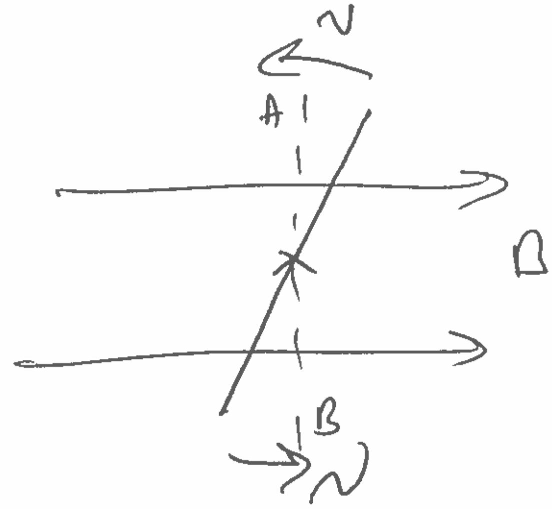


FIGURE 22.17 a, b, c



Side view



Top view

Going from (A) to (B)

for side 1

Sideview