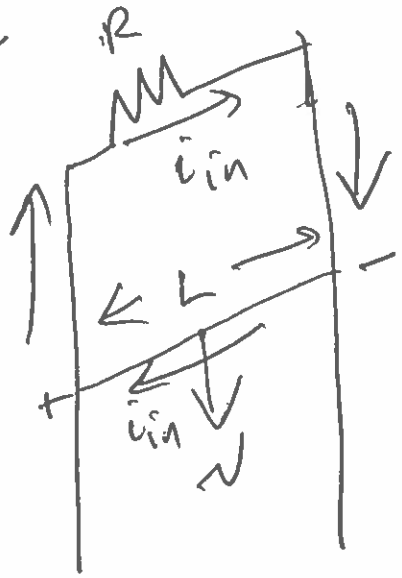
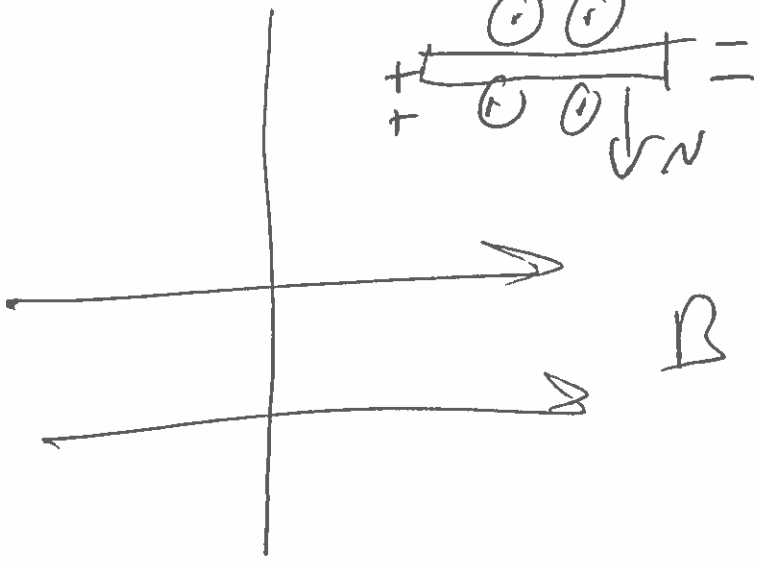
22.10





$\vec{N}$ = 4.0 m/s constant down

$\vec{B}$ = 0.50 T $\hat{R}$ ishr

$R = 0.75\,\Omega$

$L = 1.3$ m

$m_{Rod} = ?$

$\Sigma F_y = F_B - mg = 0$

$mg = F_B$

$mg = iLB$

$\vec{F}_B = i_0 \vec{L} \times \vec{B} = iLB\ \hat{UP}$

$m = \frac{iLB}{g}$ $\quad i = ?$

$i = \frac{\mathcal{E}}{R}$ $\quad \mathcal{E} = BLN$

$$i = \frac{(0.50\,T)(1.3\,m)(4.0\,m/s)}{0.75\,\Omega}$$

$$\underline{i = 3.467\,A}$$

$$m = \frac{iLB}{g} = \frac{(3.467\,A)(1.3\,m)(0.50\,T)}{9.8\,m/s^2}$$

$$\boxed{m = 0.230\,kg}$$

What is change in Gravitational potential Energy in 0.20 s?

$$\Delta U = mg\Delta h = -mgd$$

$$\Delta U = -mgvt = -(.230kg)\left(9.8\frac{m}{s^2}\right)\left(4.0\frac{m}{s}\right)(0.20$$

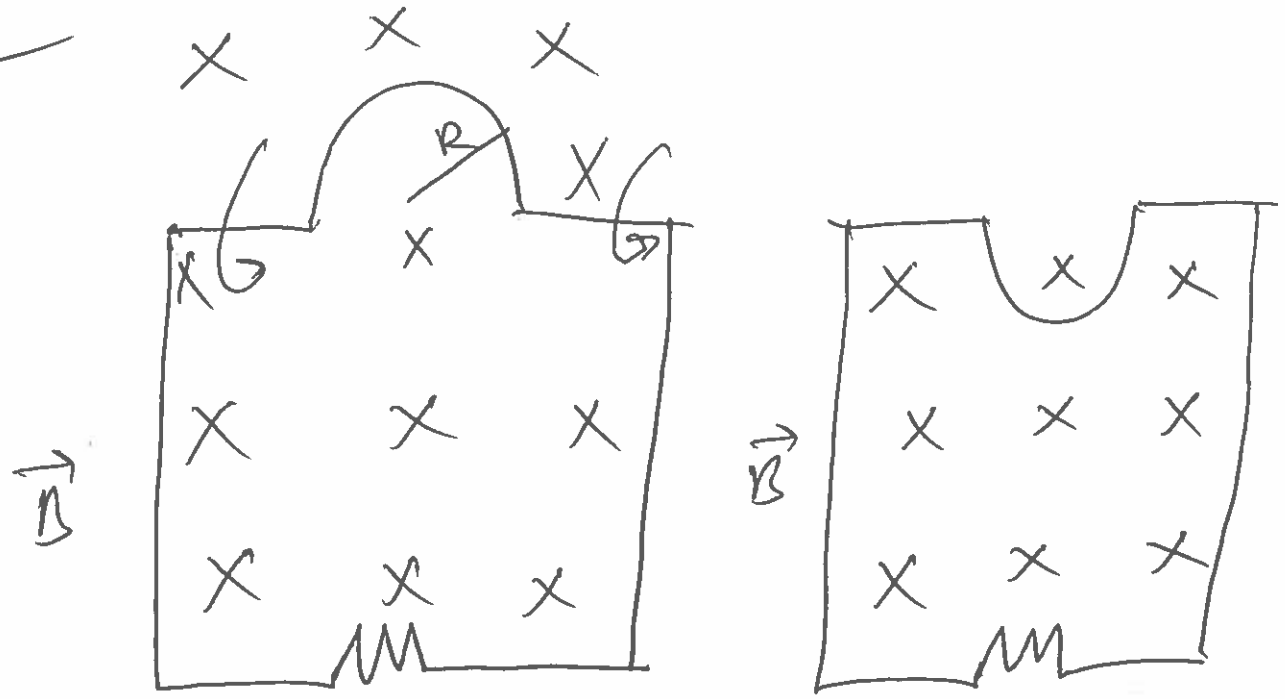
$$\underline{\Delta U = -1.8\,J}$$

$$P_R = i^2R$$

$$\Delta E_{\text{Resist dissipated}} = i^2Rt = (3.467A)^2(.75\Omega)(.20s)$$

$$\underline{E_{Diss} = 1.8\,J}$$

22.14



$B = 0.75\,T \qquad R = 0.20\,m \qquad \Delta\Phi_B = ?$

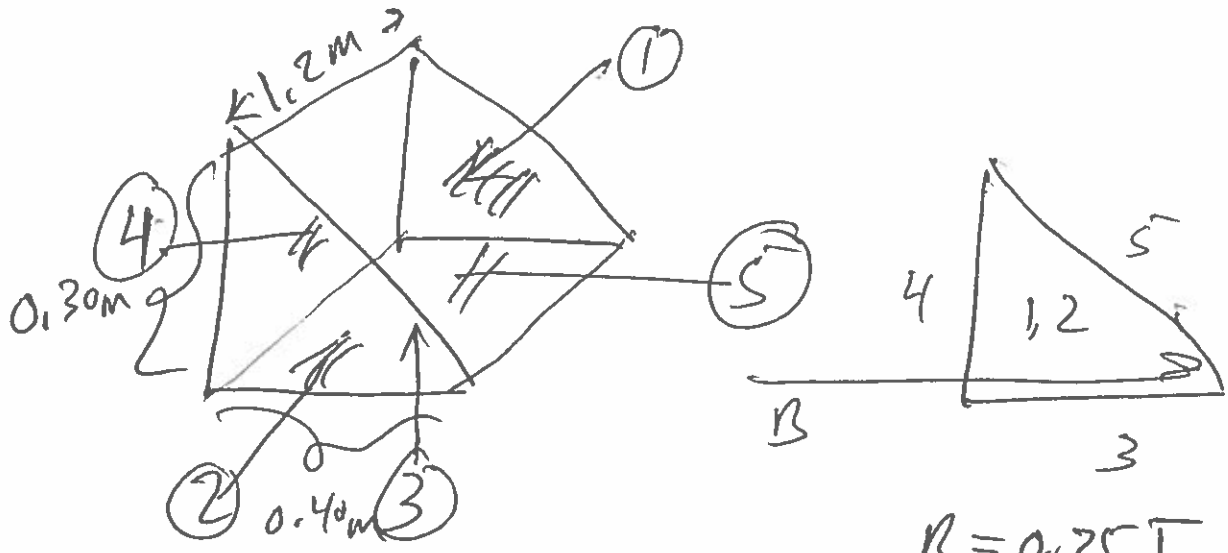
$$\Phi_B = BA\cos 0^\circ = BA$$

$$\Delta\Phi_B = \Delta(BA) = B(\Delta A) = B(-\pi R^2)$$

$$\Delta\Phi_B = -(0.75\,T)\,\pi\,(.20\,m)^2 = -0.094\,\underset{\sim}{T\,m^2}$$
$$\underset{\sim}{Wb}$$

i_{ind} in Resistor $\Rightarrow$ RIGHT TO LEFT.

22.17



$B = 0.25\,T$

$$\Phi_B = \vec{B} \cdot \vec{A} = B A \cos\theta_{AB}$$

$$\Phi_{B1} = B A_1 \cos 90^\circ = 0$$

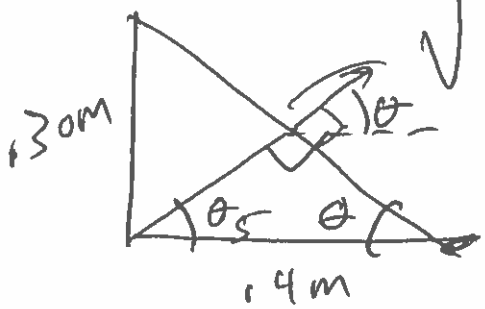
$$\Phi_{B2} = B A_2 \cos 90^\circ = 0$$

$$\Phi_{B3} = B A_3 \cos 90^\circ = 0$$

$$\Phi_{B4} = B A_4 \cos(180^\circ) = -B A_4$$

$$\Phi_{B5} = B A_5 \cos\theta_5$$

$$\Phi_{B4} = -(0.25\,T)(1.2\,m)(0.30\,m) = \boxed{-0.090\ Wb}$$



$$\sqrt{(.3\,m)^2 + (.4\,m)^2} = .5\,m$$

$$\theta = \tan^{-1}\left(\frac{.30\,m}{.40\,m}\right) = 36.9^\circ$$

$$\theta_S = 90 - 36.9^\circ = 53.1^\circ$$

$$\Phi_{BS} = B A_S \cos\theta_S$$

$$= (.25\,T)(1.2\,m)(.5\,m)\cos(53.1^\circ)$$

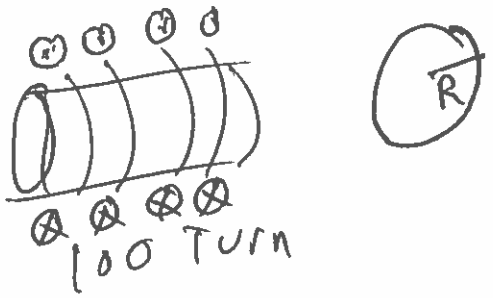
$$\boxed{\Phi_{BS} = 0.090\ wb}$$

eg/ a 10 turn coil has a change in Magnetic flux Going from $30\ Tm^2 \rightarrow 15\ Tm^2$ in a time of 0.1 s, what $\mathcal{E} = ?$

$$\mathcal{E} = -N\frac{\Delta \Phi_B}{\Delta t} = -(10\ \text{turns})\frac{(30\ Tm^2 - 15\ Tm^2)}{.1\ s}$$

$$\mathcal{E} = -\frac{10\ (15\ Tm^2)}{.1\ s} = -1500\ V$$

ex/



$R = .10m$

100 Turn

.125m Long

i Go from 10A → 5A

in 2S