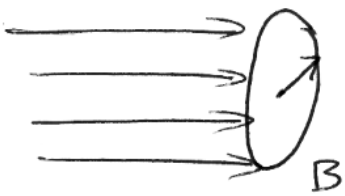
CH 20 HWK

P: 1, 3, 7, 10, 18, 23, 26, 28

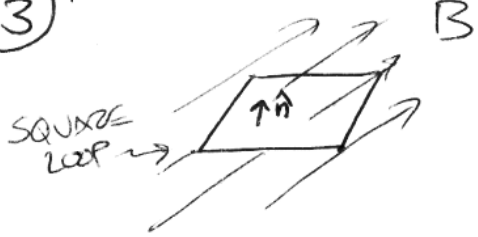
1

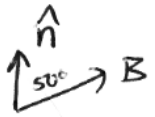


$\Phi = B \cdot A = (.30T)(\pi(.25)^2)$

$\Phi = \boxed{.059 \text{ Wb}}$

3





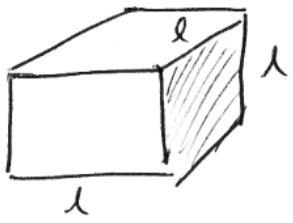
$\Phi = B \cdot A \sin\theta$ or $B \cdot A \cos\theta$

IF θ IS BETWEEN PLANE OF LOOP AND B

IF θ IS BETWEEN $\hat{n}$ AND B

$\Phi = (.300T)(2m)^2 \cos 50^\circ = \boxed{.771 \text{ Wb}}$

7 (a)



$B_x = 5T$

$B_y = 4T$

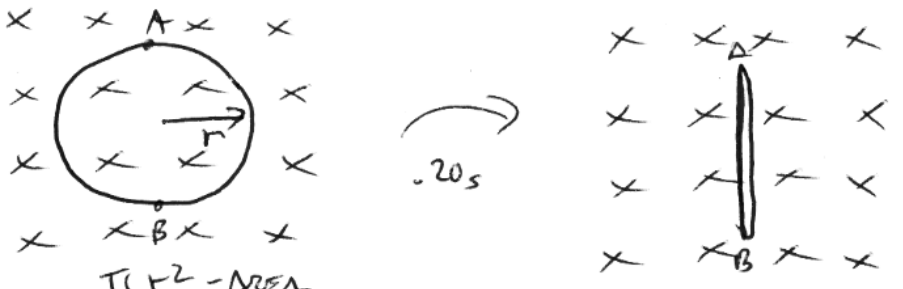
$B_z = 3T$

THE SHADED FACE IS PARALLEL TO THE YZ PLANE SO ONLY B_x GOES THROUGH THE FACE

$\Phi = B_x A = (5T)(l^2) = 5(.025)^2 = \boxed{.0031 \text{ Wb}}$

(b) ZERO!! (B FIELDS ARE CLOSED LOOPS - ANY LINE ENTERING THE CUBE MUST LEAVE ...)

10



$\pi r^2 = \text{AREA}$

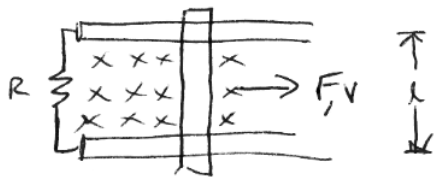
ZERO AREA
ZERO FLUX

$r = .12m$

$B = .15T$

$\mathcal{E} = N\frac{\Delta\Phi}{\Delta t} = \frac{\Phi}{t} = \frac{B(\pi r^2)}{t} = \frac{(.15)(\pi)(.12)^2}{.20} = \boxed{.034 \text{ V}}$

(18)



$R = 6.00\,\Omega \quad l = 1.20\,m \quad B = 2.50\,T$

$I = .500\,A$

$$\mathcal{E} = N\frac{\Delta\Phi}{\Delta t} = \frac{\Delta BA}{\Delta t} = B\frac{\Delta A}{\Delta t} = Bl\frac{\Delta d}{\Delta t}$$

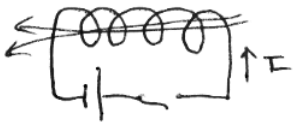
$$IR = Blv$$

$$v = \frac{IR}{Bl} = \frac{(.5)(6)}{(2.5)(1.2)} = \boxed{1\ m/s}$$

(23) a) MOVE THE MAGNET TO THE LEFT AND THE FLUX THROUGH THE SOLENOID DECREASES. THUS THE INDUCED CURRENT FLOWS FROM LEFT TO RIGHT IN THE RESISTOR (LENZ'S LAW)

b) MOVE THE MAGNET TO THE RIGHT AND THE FLUX INCREASES SO THE INDUCED CURRENT WILL FLOW THROUGH THE RESISTOR FROM RIGHT TO LEFT.

(26) CLOSE THE SWITCH AND THE INNER SOLENOID WILL GENERATE A B-FIELD LIKE THIS...

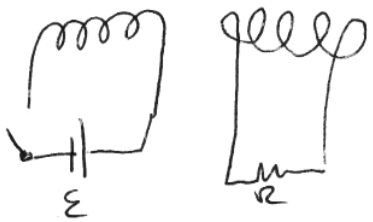


SO THE INDUCED CURRENT WILL BE...

LEFT TO RIGHT

OPPOSITE WINDINGS...

(28)



a) SWITCH JUST CLOSED = INCREASE IN FLUX TO RT
PICKUP COIL RESPONDS W/ B-FIELD TO LEFT
CURRENT L TO R IN RESISTOR

b) SWITCH CLOSED FOR AWHILE = CONSTANT FLUX
PICKUP COIL DOES NOTHING
NO CURRENT IN RESISTOR

c) SWITCH OPENED = DECREASE IN FLUX TO RT
PICKUP COIL RESPONDS W/ B-FIELD TO RT
CURRENT R TO L IN RESISTOR.