

2. 1. a. into the page

b. to the left

c. out of the page

2. a. $F = (q\vec{v}) \times \vec{B}$
 $F_B = qvB \sin 60^\circ = qvB \sin 90^\circ = qvB$
 $F_E = qE$
 $E = vB \Rightarrow E = vB$

b. $\Delta V = (1.33T)(0.02m)(10A)$
 $= \frac{(2 \times 10^{-28} m^{-3})(10^{-6} m)(1.6 \times 10^{-19})}{0.266} = 3200$
 $\Delta V = 8.31 \times 10^{-5} V$

3. $A = \pi r^2 = (\pi)(0.65 \times 10^{-15})^2 = 1.327 \times 10^{-30} m^2$

$r = N I A B \sin \theta$
 $= (1.05 \times 10^4 A)(1.27 \times 10^{-30} m^2)(2.50T)(\sin 90^\circ)$
 $= 3.48 \times 10^{-26} \approx 3.50 \times 10^{-26} N/m$

3. 1. a. $B = \mu_0 NI$

$= (4\pi \times 10^{-7})(500)(0.3)$
 $= 1.88 \times 10^{-4} \approx 1.90 \times 10^{-4} T$

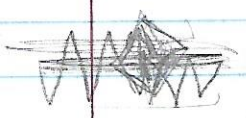
b. $B = (4\pi \times 10^{-7})(5000)(0.8)(500)$
 $= 0.942 T$

2. a. $F_{total} = F_{electrical} + F_{magnetic} = 0$
 $F_{electrical} = qE$
 $F_{magnetic} = q(\vec{v} \times \vec{B})$
 $F_{total} : qE + q(\vec{v} \times \vec{B}) = 0$
 $|F_{total}| = qE - q(\vec{v} \times \vec{B}) = 0$
 $qE = q(\vec{v} \times \vec{B})$
 $E = \vec{v} \times \vec{B} \Rightarrow v = \frac{E}{B}$ if $F_{net} = 0$

b. $qvB = \frac{mv^2}{r}$
 $r = \frac{mv}{qB} = r = \frac{qB}{m \frac{v}{r}}$

$r = \frac{mE}{qB^2}$

$$2 \Delta t = \frac{L \Delta I}{3} = \frac{0.002}{0.1} \times \frac{500}{4 \times 10^{-7} \text{ s}}$$



5. 1. $\text{emf} = -N \left(\frac{d\Phi}{dt} \right) \Rightarrow \text{emf} = \left| \frac{dI}{dt} \right| = \frac{0.150 \text{ V}}{0.50 \text{ H}} = \boxed{0.30 \text{ A/s}}$

d $V = IR$
 $I = \frac{V}{R} = \frac{0.057 \text{ V}}{5.2} = \boxed{0.0114 \text{ amps}}$

c. $E = \pi r^2 \times \frac{B_0}{T_0} (\sin(2\pi f t)) = \pi (0.1)^2 \times \left(\frac{0.1}{0.001} \right) (\sin 2\pi 10^{-8} \times (0.16 \times 10^{-8})) = \boxed{0.055 \text{ V}}$

b. $t = 0 \rightarrow \sin(2\pi f t) = 0$
 $\text{emf} = 0$
 $\boxed{\frac{B_0}{T_0} (\sin 2\pi f t) \pi r^2}$

$= (1) \left(\frac{d(BA)}{dt} \right) \quad * BA = \pi r^2$

4. 1. a. $E = -N \left(\frac{d\Phi}{dt} \right)$

c. $m = 16 (1.7 \times 10^{-27}) = 2.7 \times 10^{-26} \text{ kg}$
 $r = \frac{(2.7 \times 10^{-26} \text{ kg}) (10 \text{ V/m})}{(16 \times 10^{-19} \text{ C}) (0.01 \text{ T})^2} = \boxed{0.017 \text{ m}}$