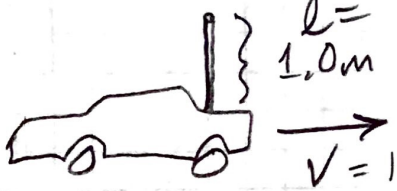
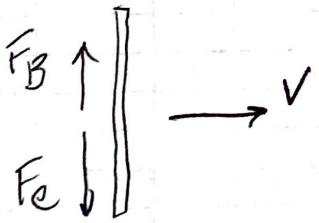
13.37



$$V = 100\,\frac{km}{hr} \times \frac{1\,hr}{3600\,s} \times \frac{1000\,m}{1.00\,km} = 27.8\,m/s$$

$B = 5.5e-5\,T$



$F_B = qvB$ (max),

induced emf $V = Ed$, &

charges migrate until $F_B = F_e$

$qvB = qE$

$qvB = q\frac{V}{d}$

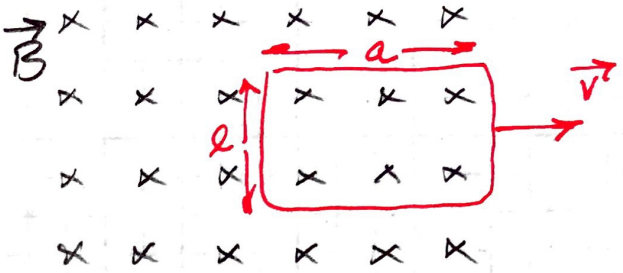
$\Delta V = \mathcal{E} = Bvd$

$\Delta V = Blv$

$\Delta V = (5.5e-5\,T)(1.0m)(27.8\,m/s)$

$= \boxed{1.53e-3\,V}$

13.38



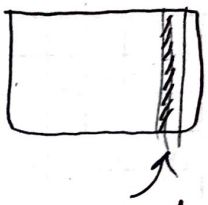
a) Find induced emf in loop of N turns.

$\mathcal{E} = -N\frac{d\Phi_B}{dt}$, where magnetic flux $\Phi_B = B \cdot A$

$\mathcal{E} = -N\frac{B\,dA}{dt}$

$= -NBl\frac{da}{dt}$

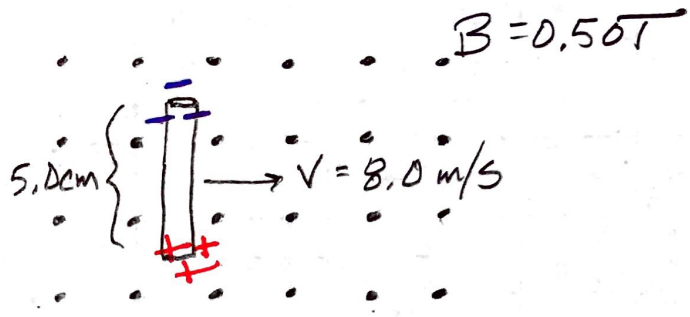
$\mathcal{E} = \boxed{-NBlv}$



$dA = l\frac{da}{dt}$

b) This emf is generated by the Force applied to the coil to move it through a distance across the magnetic field.

13.42



$\mathcal{E} = \Delta V = Blv$ (see previous derivation)

$= (0.50\,T)(0.05\,m)(8.0\,m/s)$

$= \boxed{0.20\,V}$

According to the RHR, positive charges accumulate at the bottom of the rod, which is at higher potential.