5.3

a) Since V is perpendicular to $\vec{E}$ & $\vec{B}$,

$\vec{V} \times \vec{B} = VB\hat{E}$

and $\vec{E}$ is such that $F = 0$,

meaning $\vec{E} = VB\hat{E} \Rightarrow E = VB \Rightarrow V = \frac{E}{B}$

b) $mv = qBR \Rightarrow m\left(\frac{E}{B}\right) = qBR \Rightarrow \frac{q}{m} = \frac{E}{RB^2}$

From 5.2 we can express R in terms of the length of the tube inside the magnetic field, a, and "its" deflection from the centerline, d, as $R = \frac{a^2+d^2}{2d}$,

and so

$\frac{q}{m} = \frac{2dE}{B^2(a^2+d^2)}$