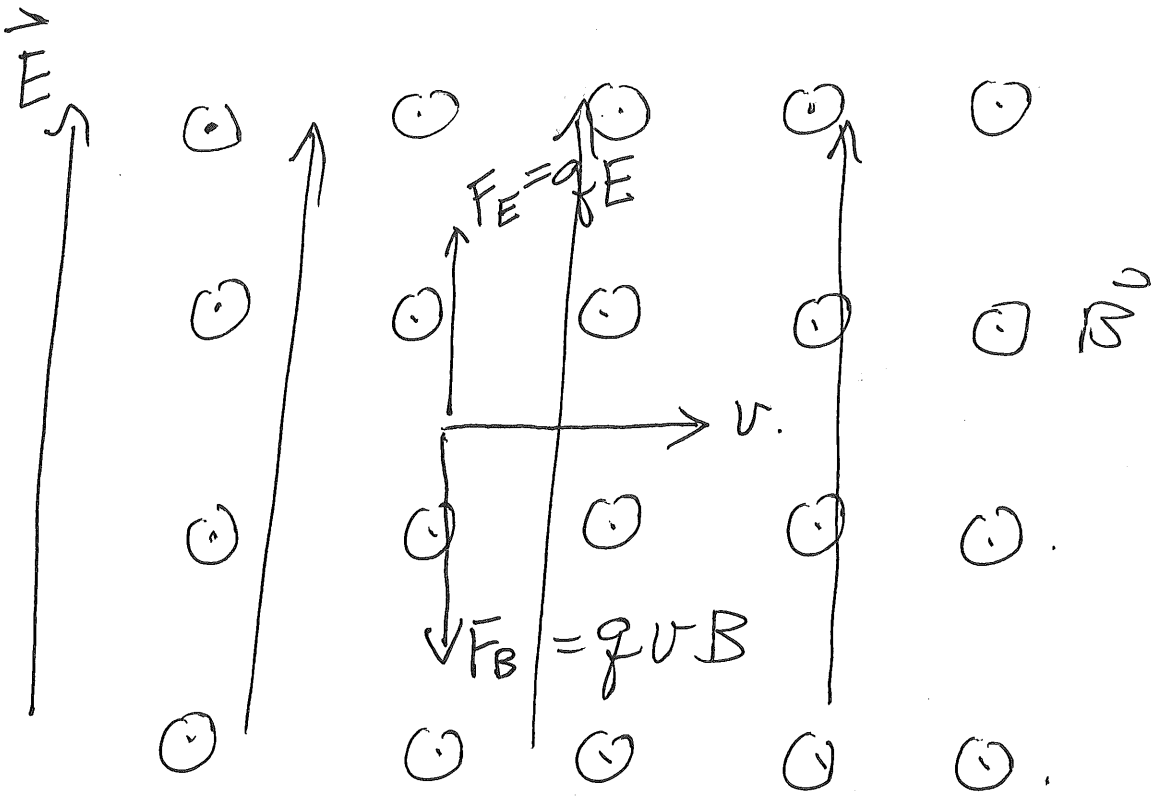
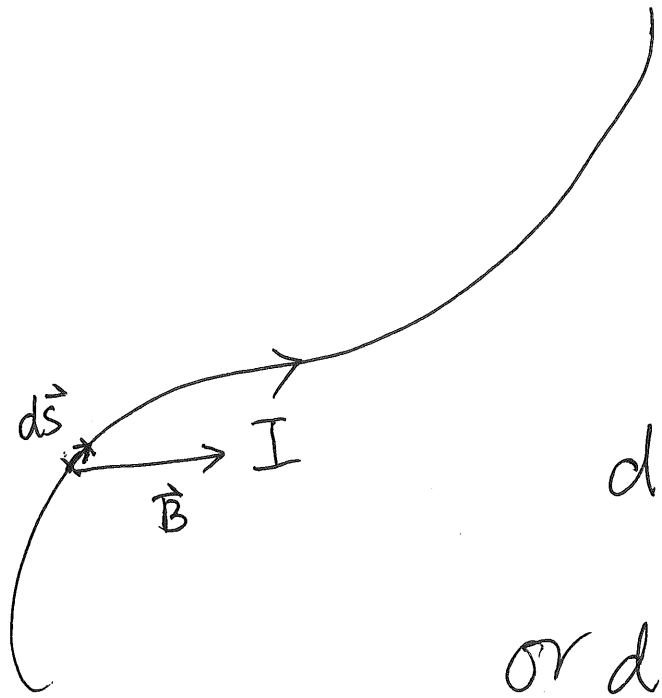


$$qE = qvB.$$

Particle will move in a straight line if

$$v = \frac{E}{B}.$$



$$d\vec{F} = I\, d\vec{\ell} \times \vec{B}$$

$$\text{or } d\vec{F} = I\, d\vec{s} \times \vec{B}$$

For particular case:

Straight wire in uniform field.

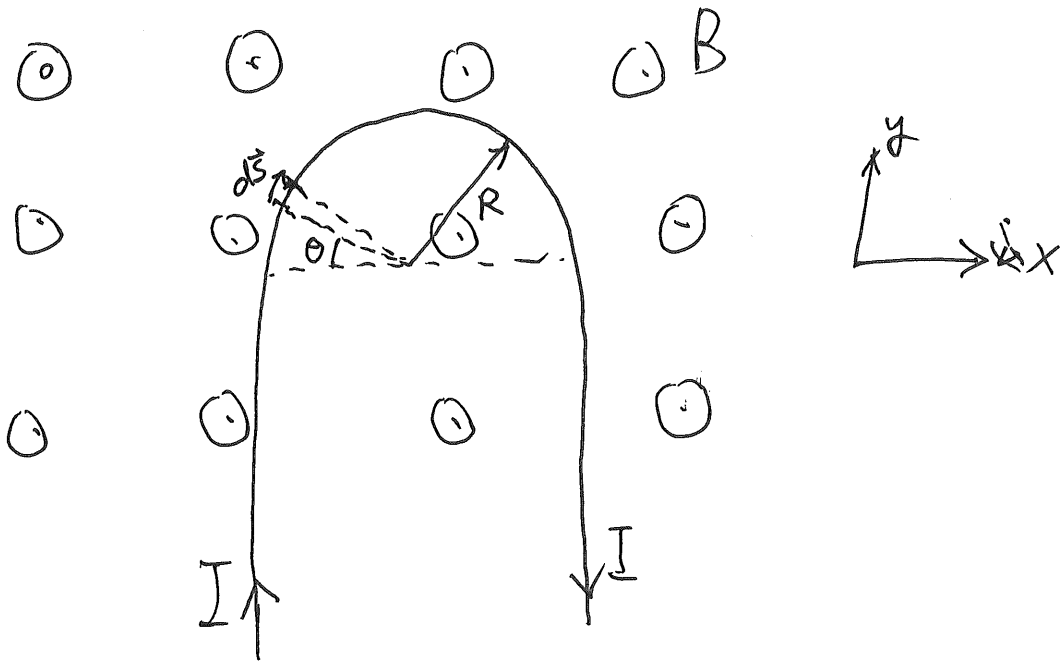
$$d\vec{F} = I\, d\vec{s} \times \vec{B} = I B \sin\theta\, ds\, \hat{m}$$

$\hat{m}$ ↑ some unit vector.

$$\vec{F} = \int d\vec{F} = \int I B \sin\theta\, ds\, \hat{m}$$

$$= I B \sin\theta\, \hat{m} \int ds = I B \sin\theta\, \hat{m} \cdot L$$

$$= I \vec{L} \times \vec{B}$$



$$d\vec{F} = I\,ds\,B\sin 90^\circ \cdot \odot$$

$$= I\,ds\,B\,(\cos\theta\,\hat{i} - \sin\theta\,\hat{j}).$$

$$\int_0^\pi \cos\theta\,d\theta = 0.$$

$$\therefore d\vec{F} = \int_0^\pi -I\,B\sin\theta\cdot R\,d\theta\,\hat{j}$$

$$= +IBR\hat{j}\,[\cos\theta]_0^\pi = \underline{-2IBR\hat{j}}$$