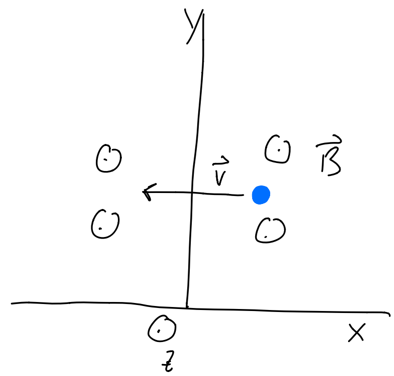
P26:



$$\vec{F} = q\,\vec{v} \times \vec{B}$$

$$= -e\,(-4 \times 10^{5})(0.27)\ \hat{x} \times \hat{z}$$

$$\boxed{|\vec{F}| = 1.73 \times 10^{-14}\ \text{N} \qquad \hat{F} = -\hat{y}}$$

P27. $\vec{F} = q\vec{v} \times \vec{B}$

$\vec{v} = 8\times10^{5}\ \hat{z}$

$\vec{B} = -0.32\,\hat{z}$

$\boxed{\vec{F} = 0}$ $(\hat{z} \times \hat{z} = 0)$

P37. $\vec{F} = I\vec{L} \times \vec{B}$

$I = 1.8A$

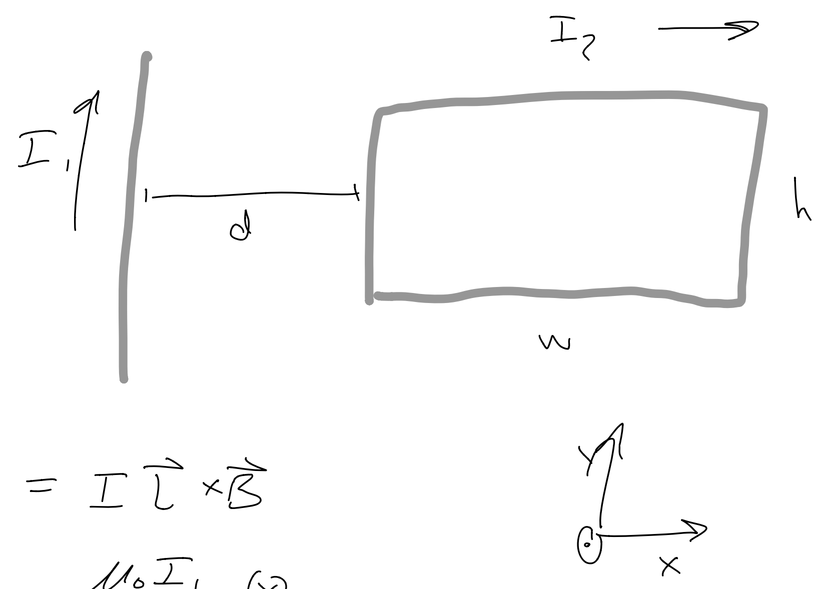
$\vec{L} = 0.25\,\hat{x}$

$\vec{B} = 0.54\,\hat{y}$

$\vec{F} = (1.8)(0.25)(0.54)\ \hat{x} \times \hat{y}$

$\boxed{\vec{F} = 0.243\,\hat{z}}$

P42.



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

$\vec{B} = \frac{\mu_0 I_1}{2\pi r} \otimes$

$\vec{B} = -\frac{\mu_0 I_1}{2\pi r}\hat{z}$

$\vec{F}_{Left} = I_2 \vec{L} \times \vec{B}$

$\vec{L} = h\hat{y}$

$\vec{F}_{left} = I_2 h\hat{y} \times \left(-\frac{\mu_0 I_1}{2\pi d}\hat{z}\right)$

$\vec{F}_{left} = -\frac{\mu_0 I_1 I_2 h}{2\pi d}\hat{x}$

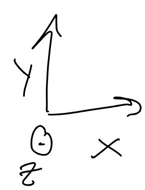
$\vec{F}_{right} = I_2(-h\hat{y}) \times \left(\frac{-\mu_0 I_1}{2\pi d+w}\hat{z}\right)$

$$\vec{F}_{right} = \frac{\mu_0 I_1 I_2 h}{2\pi(d+w)} \hat{x}$$

$$\vec{F}_{bottom} - \vec{F}_{top} = 0$$

$$\boxed{\vec{F}_{net} = \frac{\mu_0 I_1 I_2 h}{2\pi}\left(\frac{1}{d+w} - \frac{1}{d}\right)\hat{x}}$$

P45.



$$\vec{F} = q(\vec{E} + \vec{v}\times\vec{B}) = 0$$

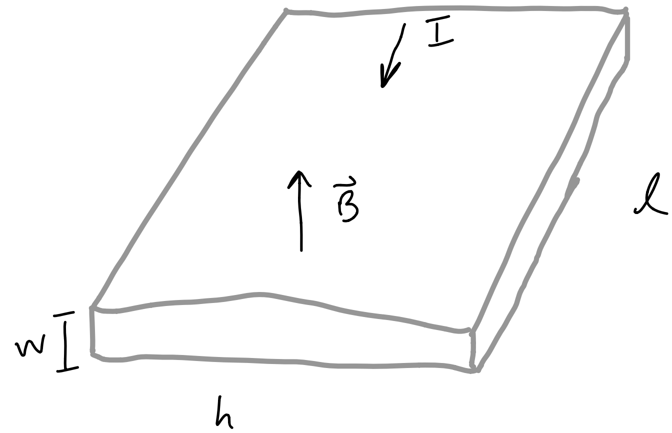
$$\vec{E} + \vec{v}\times\vec{B} = 0$$

$$(-3800\,\hat{y}) + v(-\hat{x}) \times 0.4\,\hat{z} = 0$$

$$(-3800 + 0.4v)\,\hat{y} = 0$$

$$v = \frac{3800}{0.4} = 9.5 \times 10^3\ \frac{m}{s}$$

P55.



a) $\xrightarrow{I}$ is either

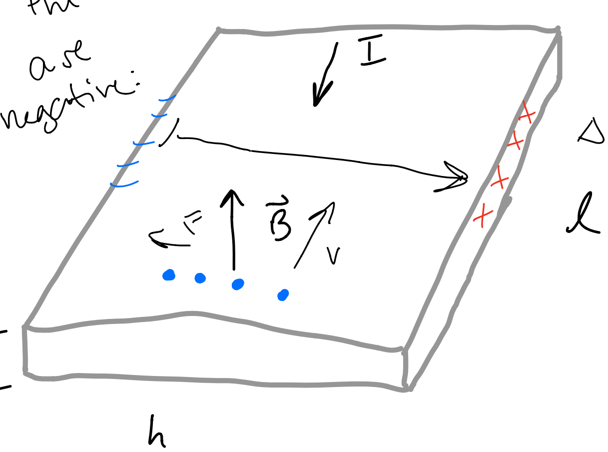
$\oplus \longrightarrow$

or

$\longleftarrow \ominus$

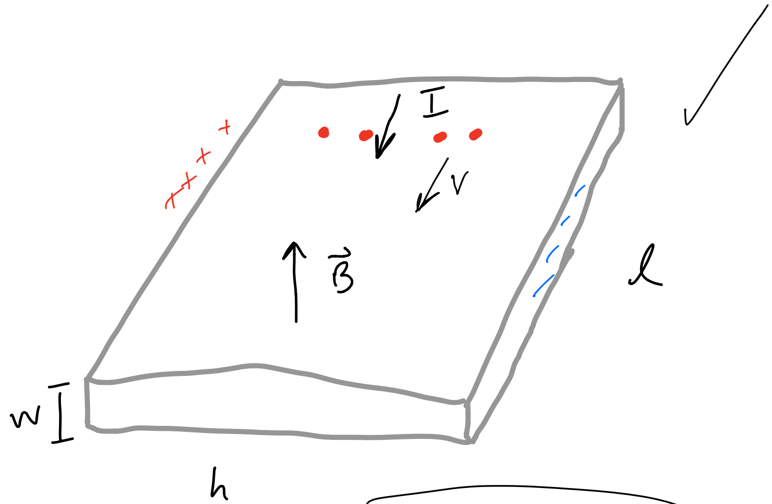
Which one is consistent w/ voltmeter?

if the charges are negative:



$\Delta V > 0$

not consistent w/ V' meter



Charges are positive

b) $|\Delta V_H| = vBh$

$$v = \frac{|\Delta V_H|}{Bh} = \frac{2.7\times10^{-4}}{(0.7)(0.08)} = 4.8\times10^{-3}\ \frac{m}{s}$$

c)

$v = uE$

get E from 2nd voltmeter

$$E = \frac{\Delta V}{\Delta x} = \frac{0.73}{0.15} = 4.9\ \frac{V}{m}$$

$$u = \frac{E}{v} = \frac{4.9}{4.8\times10^{-3}} = 9.8\times10^{-4}\ \frac{V/m}{m/s}$$

d) $I = |q| n A v$

$0.3 = e\, n\, A\, (4.8 \times 10^{-3})$

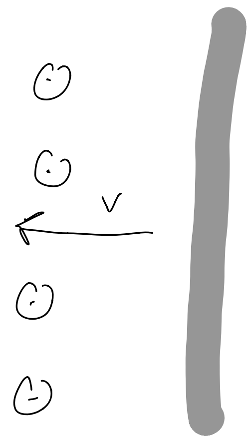
$A = 0.012 \times 0.8$

$\boxed{n = 4 \times 10^{23}\ m^{-3}}$

e) $I = \frac{\Delta V}{R}$

$R = \frac{\Delta V}{I} = \frac{0.73}{0.3} = 2.4\,\Omega$

P60.

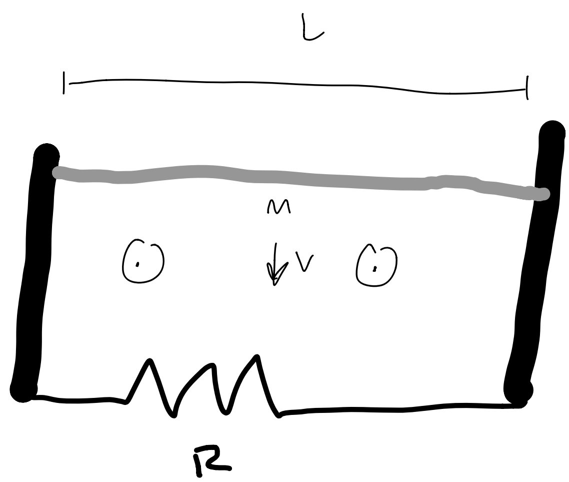


$\vec{v} \times \vec{B}$ is $\uparrow$

so e^- move $\downarrow$

answer is 3

P64.



a) $\vec{F} = -mg\hat{y} + ILB\hat{y}$

Const $v \Rightarrow \vec{F} = 0$

$$mg = ILB$$

$$I = \frac{mg}{BL}$$

c)

$$\mathcal{E} = BLv \quad , \quad I = \frac{\mathcal{E}}{R} = \frac{BLv}{R}$$

$$mg = (BL)^2 \frac{v}{R}$$

$$v = \frac{mgR}{(BL)^2}$$

d) $U_{grav} = mgy$

$$\frac{dU}{dt} = mg\frac{dy}{dt} = mgV$$

$$P_{Resistor} = I\mathcal{E}$$

$$= \frac{mg}{BL} BLv = mgV$$

✓

P65.

a) $I = 0$

b) $\mathcal{E} = Bhv$, $I = \frac{Bhv}{R}$

$$\vec{F} = ILB\,\hat{x}$$

c) $\mathcal{E} = I = 0$

d) $\mathcal{E} = Bhv$, $I = \frac{Bhv}{R}$

$$\vec{F} = ILB\,\hat{x}$$

e) $I = 0$