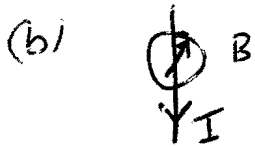


13.P.45

- (a) Current flows in the circuit from the + terminal of the battery to the - terminal.



Above the wire \vec{B} points to the right and below the wire to the left.
 \Rightarrow Compass deflects to the left.

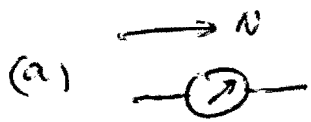


Below the wire \vec{B} points to the right.
 Same 13° deflection as at A

(c) $i = nAv = nAue$

$$E = \frac{i}{nAu} = \frac{1.5 \times 10^{18} \text{ e}^-/\text{s}}{(6.3 \times 10^{28} \text{ e}^-/\text{m}^3)(1 \times 10^{-8} \text{ m}^2)(1.2 \times 10^{-4} \text{ (m/s)/(N/C)})}$$

$$= 20 \text{ N/C} \quad \text{direction follows filament (down } \downarrow \text{ mostly)}$$

13.P.46

Current is to the left, so electrons flow to the right.

- (b) Half of the electrons go through B_2 and half through B_3 . So 1.5×10^{18} electrons per second pass P_2 .

- (c) $B_1 > B_2 = B_3$. All current goes through B_1 , but only half of current goes through B_2 and B_3 .

(d) $i = nAv = nAue$

$$E = \frac{i}{nAu} = \frac{3 \times 10^{18} \text{ electrons/s}}{(6.3 \times 10^{28} \text{ e}^-/\text{m}^3)(1 \times 10^{-8} \text{ m}^2)(1.2 \times 10^{-4} \text{ (m/s)/(N/C)})}$$

$$= 40 \text{ N/C}$$

direction follows current in filament, mostly to the left.