1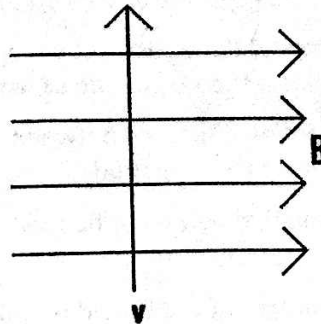. Identify the direction of the missing force, field or velocity vector in each of the scenarios shown below. You may assume positive charge moving in the direction of velocity unless otherwise noted.
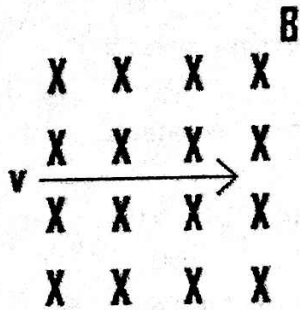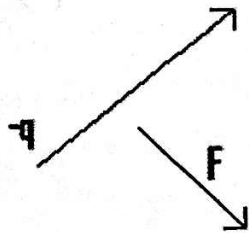

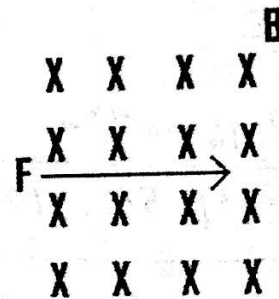B: Into Page
v: Right
F: _**North ↑**_

B: Right
v: North
F: _**Into page**_

B: _**Into page**_

v: negative charge, Northeast

F: Southeast

B: Into Page

v: _**South ↓**_
F: Right

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2. An electron beam is accelerated from rest through a potential difference of 26000 V, which exists between plates P_1 and P_2, shown in the figure below. The electron then passes through a small opening into a magnetic field of uniform field strength, B. As indicated, the magnetic field is directed into the page. The beam is stabilized and focused into a horizontal line by passing through charged plates P_3 and P_4. The electrons in the beam then enter a region of space where only the magnetic field B acts upon them.
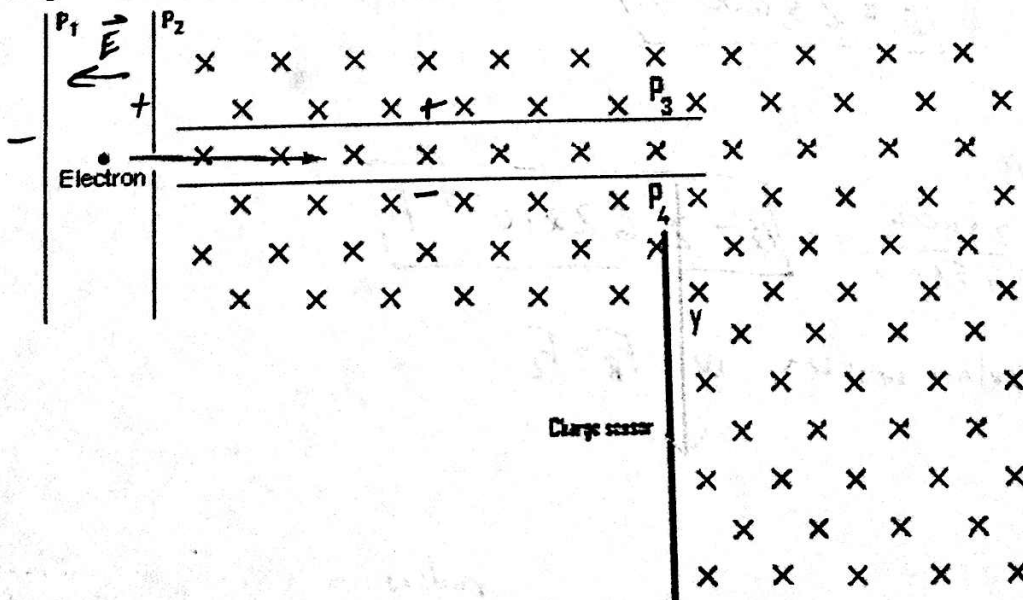
Over →

A) What is the direction of the electric field in the region between plates P1 and P2?

B) How fast is an electron moving when it passes P2?

C) The electrons experience no net force as it travels the length of the region between P3 and P4. What is the sign of the charge on each P3 and P4?

D) If the potential difference between P3 and P4 is 500V, and the distance between the plates is 2.0 cm what is the magnitude of the <u>electric</u> field in that region?

E) If the potential difference between P3 and P4 is 500V, and the distance between the plates is 2.0 cm what is the magnitude of the <u>magnetic</u> field in that region?

F) Describe qualitatively what happens when the electrons pass into the region of B-field on the right.

G) If the magnitude of the B-field is uniform in the areas shown in the diagram at what position y will the charges impact the charge sensor?

a) To the <u>left</u>

12 total

b) $V = \frac{w}{q} = \frac{KE}{q}$

$KE = V_q = 4.16 \times 10^{-15} J$

$\boxed{speed = 9.56 \times 10^{7} \text{ m/s}}$

c) $P3 = positive (+)$
$P4 = negative (-)$ $\Big\}$ B-Force is $sovrl(\downarrow)$, F_E Aposes B-Force

d) $V = Ed$, $500 = E(.02)$
$\boxed{E = 25,000 \text{ N/C}}$

e) $F_E = F_B$
$qE = qvB$
$\frac{E}{V} = B = \frac{25000}{9.56 \times 10^7} = \boxed{B = 2.62 \times 10^{-4} T}$

F) uniform circular motion w $F_B = F_c$

G) $F_c = F_B$

$\frac{Mv^2}{r} = qvB$

$\frac{Mv}{qB} = r = \frac{(9.11 \times 10^{-31})(9.56 \times 10^7)}{(1.60 \times 10^{-19})(2.62 \times 10^{-4})} = $

radius
$\boxed{2.08 m}$ $\times 2 = $

Impact diameter
$\boxed{4.16 m}$