Announcements

- Homework 8 posted! Due on Monday!
  - Should be ok to do all but maybe 1 or 2 problems after today
- I'm working on grade reports
- Physics Club tomorrow
  - Still working on solving mazes?
- Read 5.2 for Friday

Q1

A negative charge, $-q$, is moving in the $+\hat{\boldsymbol{x}}$ direction when it encounters a region of constant magnetic field pointing in the $-\hat{\boldsymbol{y}}$ direction. What is the direction of the initial net force on the charge?

A. $+\hat{\boldsymbol{y}}$
B. $-\hat{\boldsymbol{y}}$
C. $+\hat{\boldsymbol{z}}$
D. $-\hat{\boldsymbol{z}}$

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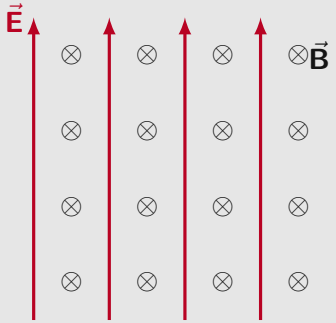
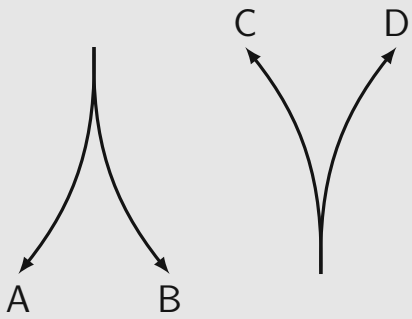
Q2

A proton, $q = +e$, is released from rest in a uniform $\vec{\mathbf{E}}$ and uniform $\vec{\mathbf{B}}$. $\vec{\mathbf{E}}$ points up, and $\vec{\mathbf{B}}$ points into the page. Which of the paths will the proton initially follow?





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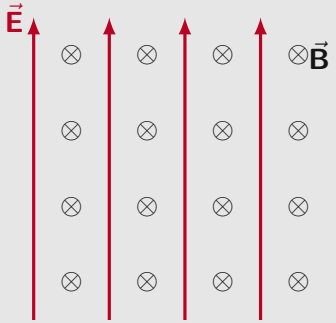
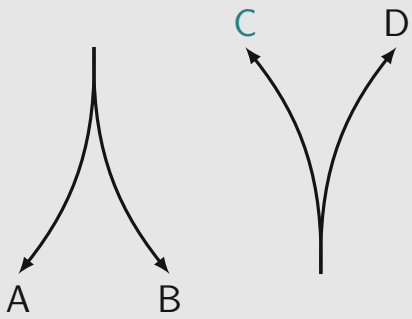
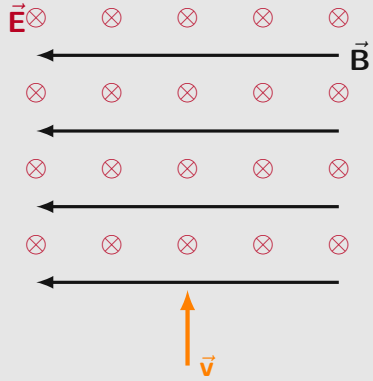




Q3

A positively charged particle moving upwards with speed v enters a region with uniform $\vec{B}$ to the left and uniform $\vec{E}$ into the page. What is the direction of $\vec{F}_{net}$ on the particle the instant it enters the region?

A. To the left
B. To the right
C. Into the page
D. Not enough info to say



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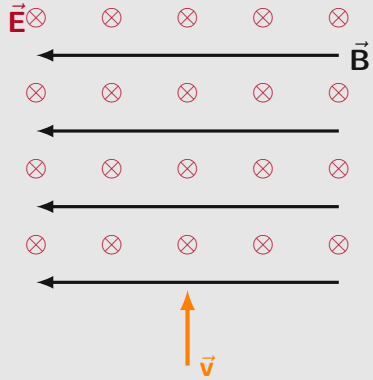
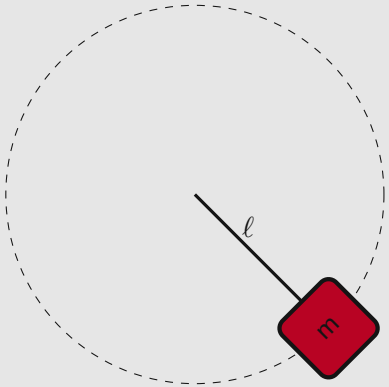


Q4

A box of mass m is attached via a rope of length ℓ to a central point. It is spinning at a constant angular speed ω. No other forces are present. What is the work done by the tension in the rope over one complete revolution?

A. 0
B. $m\omega^2\ell$
C. $2m\omega^2\pi\ell$
D. $m\omega^2\pi\ell^2$



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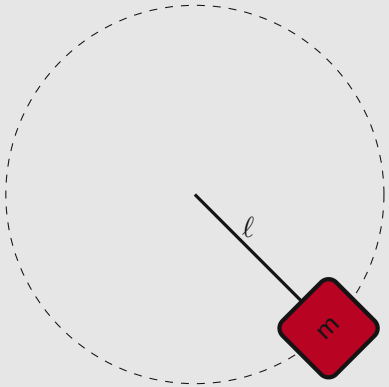

Q5

Positive ions flow right through a liquid, while negative ions flow left. The spatial density and speed of both ion types are identical. Is there a net current through the liquid?

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B. Yes, to the left
C. No
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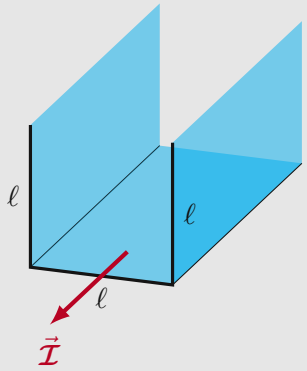
Q6

A uniform current $\vec{\mathcal{I}}$ flows through the surface to the left in the direction indicated. What is the surface current density, $\vec{\mathbf{K}}$?



A. $\dfrac{\vec{\mathcal{I}}}{\ell^3}$

B. $\dfrac{\vec{\mathcal{I}}}{3\ell}$

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D. $3\ell\vec{\mathcal{I}}$

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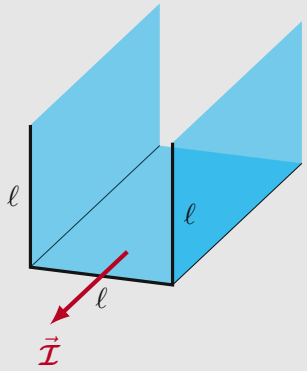

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Q7

The volume current density is defined in terms of the differential:

$$\vec{\mathbf{J}} = \frac{\mathrm{d}\vec{\boldsymbol{\mathcal{I}}}}{\mathrm{d}a_{\perp}}$$

When is it ok to determine the volume current density by taking the ratio of the current to the cross-sectional area?

$$\vec{\mathbf{J}} \stackrel{?}{=} \frac{\vec{\boldsymbol{\mathcal{I}}}}{A}$$

A. Never
B. Always
C. When $\vec{\boldsymbol{\mathcal{I}}}$ is uniform
D. When $\vec{\boldsymbol{\mathcal{I}}}$ is uniform and A is $\perp$ to $\vec{\boldsymbol{\mathcal{I}}}$

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