

## Announcements:

- ▶ Interested in evening sessions for MCAT physics preparation? If enough people are interested, I'll arrange a couple of sessions. Email me.
- ▶ The first exam will be Thursday, February 12. You will be able to make and bring a 3" × 5" card with anything that you want written on it. We will not provide formulas (except for the integrals on the step-by-step sheet), but we will provide constants.

A graphic illustration of a white teapot with a red lid and two white teacups with saucers, all decorated with red speckles. The teapot is pouring red liquid into the cups. The entire scene is set against a teal, stylized leaf background. A red speech bubble above the cups contains the text "TEA AND COOKIES SERVED".

## TOYS & TEA

THURSDAY  
FEBRUARY 5TH  
4:00 - 5:00 PM

LEARN ABOUT  
ZAPPY PHYSICS

PHYSICS  
STUDENT LOUNGE  
OLIN 251A

COME AND CONDUCT EXPERIMENTS WITH YOUR  
FAVORITE PHYSICS & ASTRONOMY FACULTY  
ALL ARE WELCOME

## Lecture 5 — Concept Test 1

A magnetic field points straight up towards the ceiling. What is the direction of the magnetic force (or is  $F_{\text{mag}} = 0$ ?) for ...

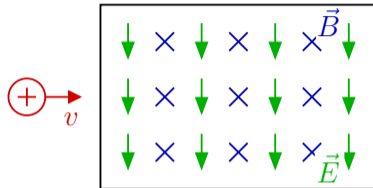
- |                 |                  |                         |                             |
|-----------------|------------------|-------------------------|-----------------------------|
| 1. $\uparrow$   | 3. $\rightarrow$ | 5. toward front of room | <b>back of card</b> $F = 0$ |
| 2. $\downarrow$ | 4. $\leftarrow$  | 6. toward back of room  |                             |

- (a) an electron sitting motionless on the table?
- (b) a proton moving towards the front of the room (towards the chalkboard)?
- (c) an electron moving towards the front of the room?
- (d) proton moving straight up towards the ceiling?
- (e) an electron moving to the right (from your perspective)?

## Lecture 5 — Concept Test 2

A particle with positive charge  $q$  and mass  $m$  moves to the right at speed  $v$ . It enters a region of uniform  $\vec{B}$  field pointing into the screen and uniform  $\vec{E}$  field pointing downward, as shown.

Which of the following sketches best shows the path of the particle?

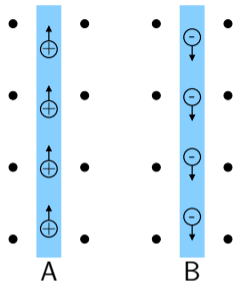


- 1.
- 2.
- 3.
4. Not enough info. It depends on the charge  $q$
5. Not enough info. It depends on the mass  $m$
6. Not enough info. It depends on the speed  $v$

## Lecture 5 — Concept Test 3

Two conductors are located in a uniform magnetic field pointing out of the page. In conductor A, positive charges move upward, while in conductor B negative charges move downward.

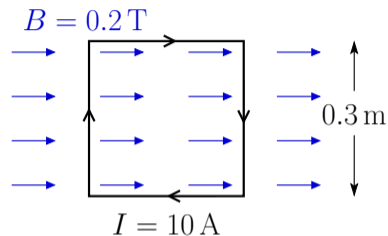
What is the direction of the force on the two conductors?



1. Left for A, right for B
2. Left for A, left for B
3. Right for A, right for B
4. Right for A, left for B
5. Into page for A, out for B
6. The force is zero for both

## Lecture 5 — Concept Test 4

For the square loop in the example, what is the direction of the magnetic moment  $\vec{\mu}$ ?



1.  $\uparrow$

2.  $\rightarrow$

3.  $\downarrow$

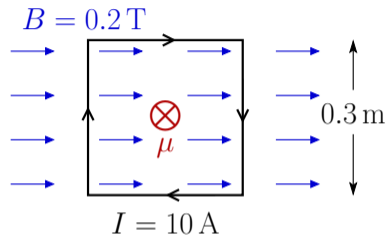
4.  $\leftarrow$

5.  $\odot$  (out of screen)

6.  $\otimes$  (into screen)

## Lecture 5 — Concept Test 5

Continuing ... We know that the magnetic moment  $\vec{\mu}$  points into the screen. What is the direction of the torque acting on the square loop?



1.  $\uparrow$

2.  $\rightarrow$

3.  $\downarrow$

4.  $\leftarrow$

5.  $\odot$  (out of page)

6.  $\otimes$  (into page)