WebAssign
**CH21-HW05-FALL2010 (Homework)**

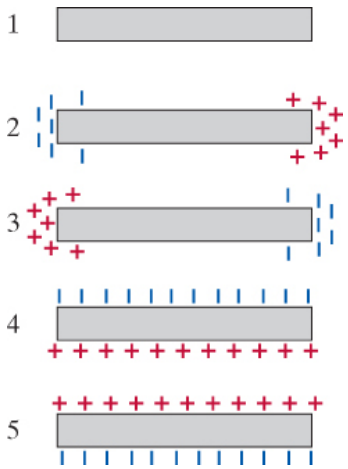
Yinglai Wang
PHYS 272-FALL 2012, Fall 2012
Instructor: Virendra Saxena

**Current Score :** 19 / 19 **Due :** Friday, November 9 2012 11:59 PM EST

**1.** 1/1 points | Previous Answers MI3 21.5.X.076

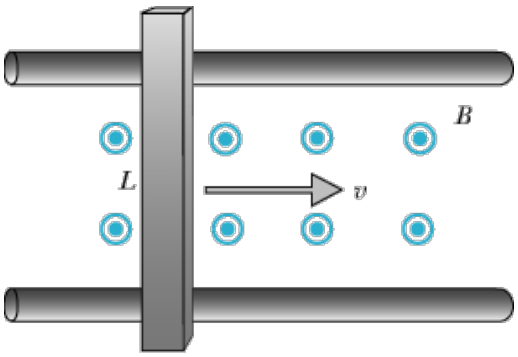
A neutral copper bar oriented horizontally moves upward through a region where there is a magnetic field out of the page. Which diagram correctly shows the distribution of charge on the bar?

2 ✔




- *Read the eBook*
- Section 21.5

**2.** 10/10 points | Previous Answers MI3 21.9.X.091




A neutral metal rod of length 0.25 m slides horizontally at a constant speed of 7 m/s on frictionless insulating rails through a region of uniform magnetic field of magnitude 0.5 tesla, directed out of the page as shown in the diagram. Before answering the following questions, draw a diagram showing the polarization of the rod, and the direction of the Coulomb electric field inside the rod.

Which of the following statements is true?

- ○ The top of the moving rod is positive.
- ◉ The top of the moving rod is negative.
- ○ The right side of the moving rod is positive.
- ○ The right side of the moving rod is negative.
- ○ The moving rod is not polarized.

✓

After the initial transient, what is the magnitude of the net force on a mobile electron inside the rod?

$|\vec{F}_{net}|$ = 0 ✓ N

What is the magnitude of the electric force on a mobile electron inside the rod?

$|\vec{F}_{el}|$ = 5.6e-19 ✓ N

What is the magnitude of the magnetic force on a mobile electron inside the rod?

$|\vec{F}_{mag}|$ = 5.6e-19 ✓ N

What is the magnitude of the potential difference across the rod?

$|\Delta V|$ = 0.875 ✓ volts

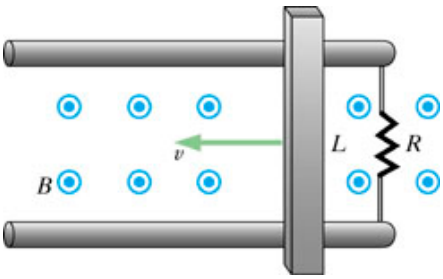
In what direction must you exert a force to keep the rod moving at constant speed?

- ○ To the right
- ○ To the left
- ◉ No force is needed

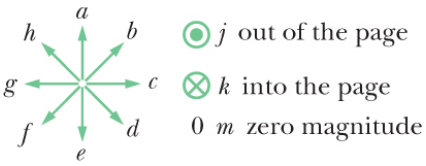
✓

- *Read the eBook*
- Section 21.9

**3.** 2/2 points | Previous Answers

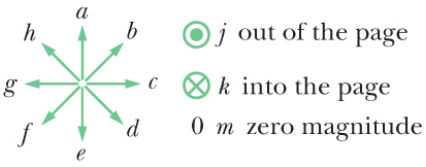



(a) In which direction will conventional current flow through the resistor in the figure?




e ✔

(b) What will be the direction of the magnetic force on the moving bar?

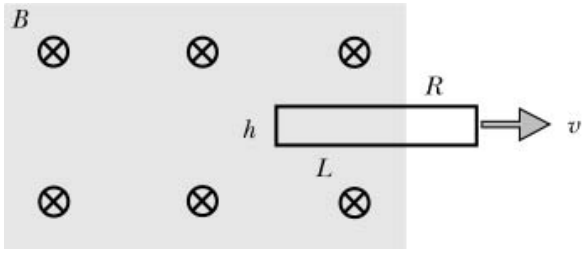



c ✔

**4.** 6/6 points | Previous Answers MI3 21.5.P.082

**Pull a rectangular loop through a magnetic field**

In the figure a rectangular loop of wire $L$ = 14 cm long by $h$ = 7 cm high, with a resistance of $R$ = 0.6 ohms, moves with constant speed $v$ = 4 m/s as shown. The moving loop is partially inside a rectangular region where there is a uniform magnetic field (gray area) and partially in a region where the magnetic field is negligibly small.

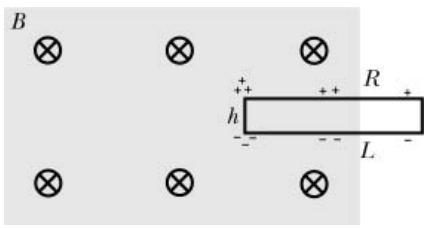



In the gray region, the magnetic field points into the page, and its magnitude is $B$ = 1.5 tesla.

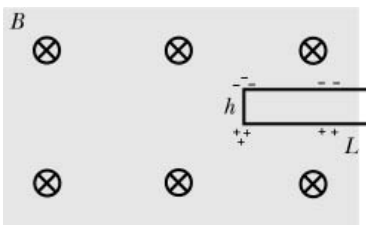
(a) Which of the following diagrams correctly shows the charge distribution on the moving loop?

A ✔

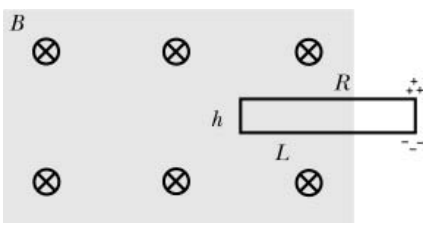
A




B



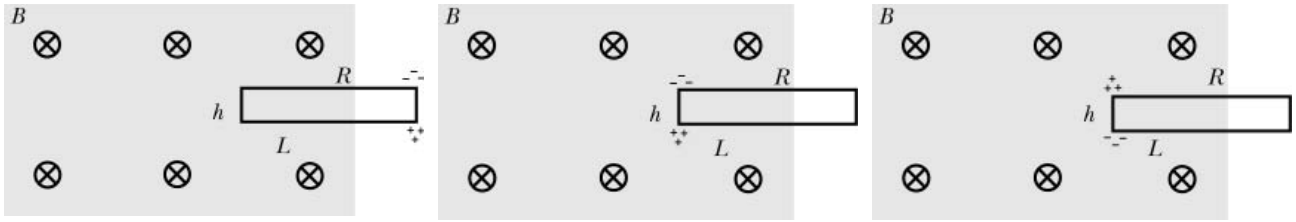

C



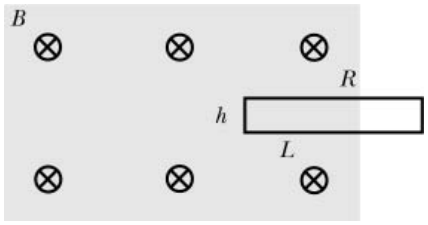

D

E

F




G




(b) What is the direction of the conventional current?

clockwise ✔

(c) What is the conventional current in the loop?

0.7 ✔ A

(d) Which of the following are true? Check all that apply.

- ☐ The magnetic force on the loop is in the same direction as the velocity of the loop.
- ☐ The magnetic force only stretches the loop; the net magnetic force on the loop is zero.
- ☑ Because a current flows in the loop, there is a magnetic force on the loop.

✔

(e) What is the magnitude of the magnetic force on the loop?

7.35e-2 ✔ N

- *Read the eBook*
- Section 21.5