Smith's Answers

A.P. Physics - B

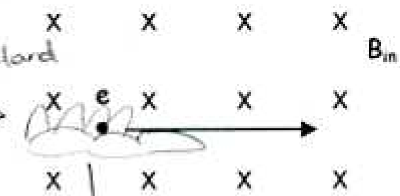
Unit 10 Test Review

Magnetism: Chapters 20-21

Multiple Choice Review: **On this portion of the test, you will not be allowed to use your calculator or AP formula sheet. (You may, however, use your AP table of information.) Approximate $g=10m/s^2$ for simplicity of calculations. No partial credit will be given.**

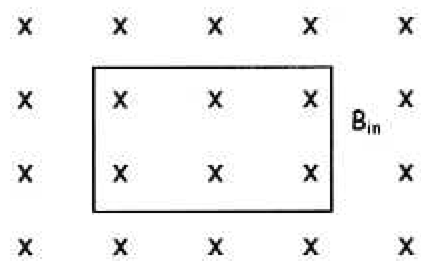
1. An electron is in a uniform magnetic field B that is directed into the plane of the page, as shown. When the electron is moving in the plane of the page in the direction indicated by the arrow, the force on the electron is directed

a. toward the right
b. toward the left
c. out of the page
d. toward the top of the page
(e.) toward the bottom of the page



2. A rectangular wire loop is at rest in a uniform magnetic field B of magnitude 2T that is directed into the page. The loop measures 5cm by 8cm, and the plane of the loop is perpendicular to the field, as shown. The total magnetic flux through the loop is

a. zero
b. .002 Wb
(c.) .008 Wb
d. .2 Wb
e. .8 Wb

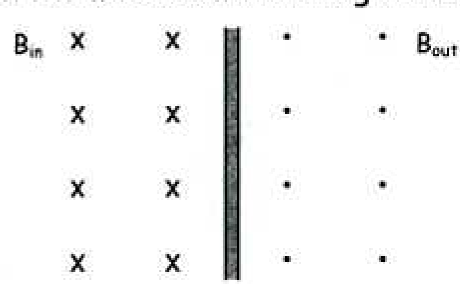


$\Phi_M = BA\cos\theta = (2)(.05 \times .08) = 2(.004)$

3. What is the direction of the current in the wire shown in the given diagram, if it causes a B-field as shown?

these are really the only 2 options

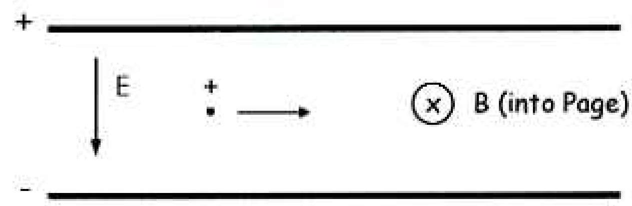
(a.) Down the page.
b. Up the page.
c. Out of the page.
d. Into the page.
e. To the right of the page.



Right-hand rule!

4. As shown, a positively charged particle moves to the right without deflection through a pair of charged plates. Between the plates are a uniform electric field E of magnitude 6.0N/C and a uniform magnetic field B of magnitude 2.0T, directed into the page, as shown in the figure. The speed of the particle is most nearly

a. 0.33m/s
b. 0.66m/s
c. 3.0m/s
d. 12m/s
e. 18m/s



Doesn't deflect because F_{elec} and F_{mag} balance out.

$F_M = F_E$

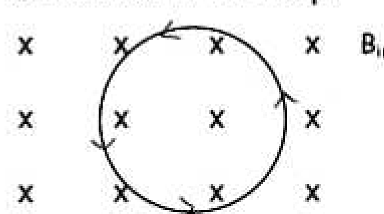
$qvB = qE$

$v = E/B = \frac{6}{2}$

5. A loop of wire is at rest in a magnetic field, as shown. If the strength of the field is increased, in what direction will current be induced in the loop?

a. Into the page.
b. Out of the page.
c. Clockwise around the loop.
d. Counterclockwise around the loop.
e. No current is induced.

these are really the only 2 options.



Increasing field makes more "Xs", so Lenz law requires that induced current tries to make more "dots."

6. Two singly-charged particles are shot with the same velocity into a uniform magnetic field (so that they are moving perpendicular to the field), and it is found that the particles both move in clockwise circular paths of different radii. Which of the following must be true of the two particles.

This means different masses.

This means they've got same sign.

a. The particles have the same charge sign but different masses.
b. The particles have the same charge sign and the same mass.
c. The particles have different charge signs and different masses.
d. The particles have different charge signs but the same mass.
e. Both particles must be neutrally-charged and massless.

7. A 3cm-long wire carrying a current of 10A is oriented perpendicular to a magnetic field B. If the strength of B decreases from 20T to 0T in 4 seconds, what is the magnitude of the average magnetic force acting on the wire during that time interval?

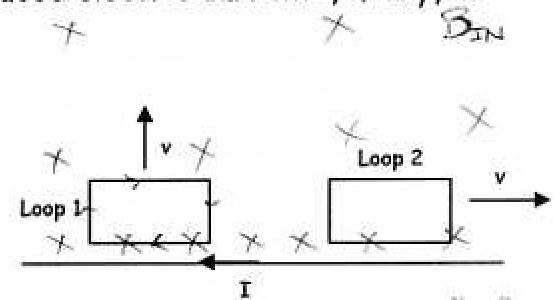
a. 0.75N
b. 1.5N
c. 3N
d. 15N
e. 30N

F_{avg} is based on B_{avg}, which equals 10T.

$F = BI\ell = (10)(10)(.03) = 3N$

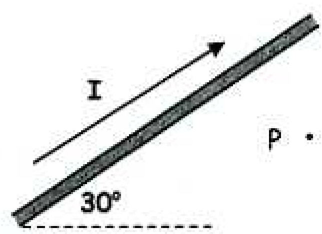
8. Two conducting wire loops move near a very long, straight conducting wire that carries a current I. When the loops are in the positions shown, they are moving in the directions shown with the same constant speed v. Assume that the loops are far enough apart that they do not affect each other. Which of the following is true about the directions of the induced electric currents, if any, in the loops?

	Loop 1	Loop 2
a.	No current	No current
b.	No current	Counterclockwise
(c.)	Clockwise	No current
d.	Clockwise	Clockwise
e.	Counterclockwise	No current



Loop 1 moving toward less "X's", so Lenz says induced current must try to make more X's. Loop 2, the B-field strength isn't changing

9. Use the right-hand rule to determine the direction of **B**, caused by **I** in the wire, at point P.
   a. Out of the page.
   (b.) Into the page.
   c. To the right.
   d. At 30° above the positive x-axis.
   e. At 60° below the positive x-axis.



Right-hand rule, like # 3.