<u>PREFLIGHTS</u>   **LESSON 36 – HOW THE FIELDS TRANSFORM (CONT.)**

LEARNING OBJECTIVE:
Determine how electric and magnetic fields transform between reference frames.

1) Study Example 12.13. Which components of the electric field are changed under the transformation? Which stay the same? Which components would change and stay the same if the charge moved in the –y-direction?

2) Describe in 2 or 3 sentences how you would find the electric field of a point charge that is moving at constant speed at a 45° angle in the x-y plane?

3) Study Example 12.14. Let's imagine a similar situation where $E = 0$ and $B \neq 0$ in the rest frame, such as the solenoid in Figure 12.40. However, if the solenoid in Figure 12.40 is moving down the x-axis, the magnetic field is unchanged and the electric field is still zero. Which way could the solenoid move so that it generates an electric field?

4) Conceptually, why is an electric field created in the previous question? That is, how do the Lorentz transformations result in an electric field when the solenoid is moving as you described?

5) *Note: This is a review question from Chapter 9.* For the plane wave defined in Equation 9.43 on page 376:

          a. What is the direction of propagation?
          b. What is the relationship between k and ω?
          c. What is the relationship between the directions and magnitudes of **E** and **B**?

6) What did you find difficult or confusing in the pre-class work? If nothing was difficult or confusing, tell me what you found most interesting. Please be as specific as possible.

7) Document whatever help you received on the preclass work.