

**PREFLIGHTS****LESSON 35 – HOW THE FIELDS TRANSFORM****LEARNING OBJECTIVES:**

- 1. Describe why relativity requires that both electric and magnetic fields exist.**
- 2. Determine how electric and magnetic fields transform between reference frames.**

1) Describe in words how an electric field in one frame of reference can look like a magnetic field in another frame of reference.

2) According to the Physics 215 textbook, the typical drift speed of electrons in current-carrying wires is about 1 mm/s. For such a small drift speed, in Equation 12.82,  $\gamma_+ \approx \gamma_- \approx 1$ , meaning  $\lambda_{\text{tot}} \approx 0$ , and no relativistic/magnetic effects occur. Obviously, something has to be wrong with that analysis. How does a current-carrying wire create a magnetic field if the drift speed of the electrons is so small?

3) Answer Problem 12.41 in Griffiths.

4) *Note: This is a review question from Chapter 9.* Compare Equations 9.65 (p. 382) and 9.121 (p. 393). Based on those equations and the analysis in Section 9.4.1, describe conceptually why electromagnetic waves are attenuated in a conductor.

5) 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.

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