

**PREFLIGHTS****LESSON 32 – LORENTZ TRANSFORMATIONS****LEARNING OBJECTIVES:**

- 1. Determine the process for transforming from one reference frame to another using the Lorentz transformations.**
- 2. Utilize more sophisticated techniques for making reference frame transformations, such as the Lorentz transformation matrix, the displacement 4-vector, and Minkowski diagrams.**

**1)** Study Examples 12.4 and 12.5. In Example 12.4, are Events A and B timelike, spacelike, or lightlike? In Example 12.5, is the measurement that takes place in reference frame  $S$  timelike, spacelike, or lightlike?

**2)** Give the definition of these three terms or tell me how they are related to each other: *covariant, contravariant, Einstein summation convention*.

**3)** Problem 12.21 in Griffiths is actually pretty simple. Describe in words how you would do it.

**4)** If a spaceship passes by moving at  $\frac{1}{4}$  the speed of light, what is the slope of its world line on a Minkowski diagram?

**5) Note: This is a review question from Chapter 7.** In Problem 7.13 on page 305 of Griffiths, assume the length of the sides of the square loop is  $a = 0.50$  m and the constant  $k$  in the magnetic field equation is  $k = 10 \text{ T}/(\text{m}^3 \cdot \text{s}^2)$ . What is the emf as a function of time induced in the loop?

**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.