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**PREFLIGHTS      LESSON 18 – ENERGY AND MOMENTUM IN EM WAVES / EM WAVES IN MATTER**

**LEARNING OBJECTIVES:**

- 1. Determine the energy, momentum, and intensity of plane electromagnetic waves.**
- 2. Figure out what changes when an electromagnetic wave propagates through a linear, homogenous medium rather than through vacuum.**

**1) Which of the following will increase the average energy density in an electromagnetic wave (more than one may apply)?**

- a. Increasing the wavelength of the wave
- b. Decreasing the wavelength of the wave
- c. Increasing the frequency of the wave
- d. Decreasing the frequency of the wave
- e. Increasing the amplitude of the wave ( $E_0$ )
- f. Decreasing the amplitude of the wave ( $E_0$ )

**2) Explain why radiation pressure on a perfect reflector is twice as great as that on a perfect absorber.**

**3) For a given plane of wave light that is incident on a transparent medium, like glass or water, will the intensity become greater, less, or stay the same when it goes from air (which is approximately like vacuum for light waves) into the medium? Assume no light is reflected at the interface.**

**4) *Note: This is a review question from Chapter 7.* What is the energy per unit length in a very long solenoid with a radius of  $r = 5$  cm, carrying a current of  $I = 100$  A, and having  $n = 5000$  turns/meter?**

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.