PHYSICS 242 BLOCK 10 DRILL SET, SPRING '17 NAME _____

Slide this drill set under Marteena 308's door any time *before* 7:50 AM Friday, March 31, or give it to me in Marteena 312 *by* 8:00 AM that day. Each problem uses one different equation from the Block 10 objectives.

1. At one position and time, the electric field of an em wave in vacuum is 6.66 MV/m into the paper (⊗) and its magnetic field is 22.2 mT left (←). Find the corresponding Poynting vector (direction relative to the paper).

(Remember to replace the metric prefixes with their powers of 10 when needed in problems on *all* drill sets.)

VECTOR EQUATION USED	SOLUTION	ANSWER
$\vec{\ }$ =	Here I use ϕ = ____° in calculating the magnitude.	_____ MAGNITUDE _____ DIRECTION

2. A linearly-polarized em wave of intensity 555 MW/m^2 moves at a speed of 1.240×10^8 m/s through diamond, which has a permittivity of 5.17×10^{-11} F/m for this em wave. Find the electric field amplitude of this em wave.

EQUATION USED (ONE = SIGN)	SOLUTION	ANSWER
=		

3. For the em wave of problem 2 above, calculate the magnitude of the magnetic field at the position and time that the electric field magnitude is 372 kV/m.

EQUATION USED (ONE = SIGN)	SOLUTION	ANSWER
=		

4. A linearly-polarized em wave moving in vacuum perpendicular to a perfectly reflecting surface exerts a radiation pressure of 392 Pa on that surface. Find the intensity of that em wave.

EQUATION USED (ONE = SIGN)	SOLUTION	ANSWER
=		

5. You are traveling north at 31 m/s in your convertible. You have just passed a slow truck, traveling south at 21 m/s. (Thus, you are moving apart at 52 m/s.) The speed of sound is 343 m/s. The truck is blasting a horn that *you* hear to be at 126 Hz. Find the frequency that the *truck driver* hears from her horn.

(You **should** complete the sketch, writing L in one O and S in the other O. Then draw an arrow showing the positive (**+**) direction. Finally, add two arrows (with signed numbers) showing the L and S velocity components.)

ONE EQUATION USED	SOLUTION	ANSWER
you O truck O	The truck driver has *no* speed relative to her horn, so she hears f__. **(Fill in the subscript.)**	f__ =