Ch8 C: 19
P: 2, 7
Ch9 C: 4, 10
P: 2, 4, 8

Physics 107
Homework 4
10/11/06

Ch 8 C19. The atoms which make up these objects have equal numbers of positive and negative charged particles. These charges cancel each other, leaving the object neutral (zero net charge). With no net charge, there is no net electric force.

P2. $\lambda_{AM} \sim$ football field $\lambda_{AM} = 100\,\lambda_{FM}$

$\lambda_{FM} \sim 1\,m$

$v = \lambda f \rightarrow f \propto \frac{1}{\lambda} \rightarrow f_{AM} \propto \frac{1}{\lambda_{AM}} = \frac{1}{100\,\lambda_F} \propto \underline{\frac{1}{100}\,f_{FM} = f_{AM}}$

P7. $f = 3\,Hz$ $v = 2\,m/s$ $\lambda = ?$

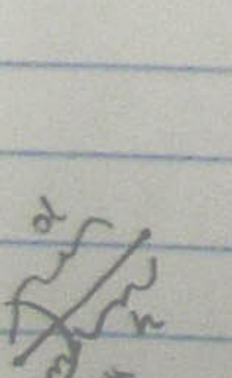
$v = \lambda f$ $\lambda = \frac{v}{f} = (2\,m/s)/(3\,Hz) = \underline{2/3\,m = \lambda}$

Ch 9 C4 With a twenty minute travel time for light, all conversations would have a lag of twenty minutes. This would make two-way conversations difficult, as each would have to wait 20-minutes for a response. Using an ultra-powerful telescope would not change the speed of the conversation. The signals would travel at the same speed (the speed of light), so the travel time for the signal would be the same.

C10. Visual light and radio waves are both electromagnetic waves. The only difference between them is their wavelength or frequency.

P2. $t = 3\,s$ $v = c = 3\times10^8\,m/s$ (because radar is an electromagnetic wave)

$d = ?$ $v = d/t \rightarrow d = vt = ct = (3\times10^8\,m/s)(3\,s) = \underline{9\times10^8\,m = d}$



P4. $d = 36{,}000\,km$ $v = c = 3\times10^8\,m/s$ $t = ?$ $v = d/t$

$h = 36{,}000\,km - r_{Earth} = (36{,}000 - 6{,}000)\,km = 30{,}000\,km$ $t = \frac{d_{tot}}{v} = \frac{60{,}000{,}000\,m}{3\times10^8\,m/s}$

$h_{total} = 2\times30{,}000\,km = 60{,}000\,km$ $\underline{t = 0.20\,s}$

P8. $f = 6\times10^{14}\,Hz$ $v = c = 3\times10^8\,m/s$ $v = \lambda f \rightarrow \lambda = \frac{v}{f} = \frac{3\times10^8\,m/s}{6\times10^{14}\,Hz} = 5\times10^{-7}\,m = 500\,nm$

This wavelength is ~1000x larger than the size of an atom.