Physics 109: Homework Questions
(Handout #3)

Homework #5   Due 8 Oct   Deadline 12 Oct

5.1 Find out the frequencies of your favorite AM and FM radio stations. Calculate the wavelengths of their transmissions in meters. Suppose that you want to listen to the AM station but only the FM portion of your radio is working. How fast would you need to be traveling so that you could pick up your favorite AM station when your radio is set to the frequency of your favorite FM station? Would you need to be moving toward or away from the transmitting source?

5.2 Compare the flux of solar radiation that the Earth receives with the flux received by the planet Mars. Use numerical values in the Appendices of your book if necessary.

5.3 In your own words define reflection, refraction, and dispersion. Give an everyday example of each.

5.4 List three reasons why astronomers put observatories in space. Be sure not to restrict your answer to only the visible band of the electromagnetic spectrum.

5.5 Compare the light gathering power and the resolution of the largest telescope in the world (the Keck telescope) with your eye at a wavelength of 550 nm. (Hint: Assume that the pupil of your eye can open to about 0.8 cm.)

Homework #6   Due 15 Oct   Deadline 19 Oct

6.1 Suppose the Earth were twice as massive as it really is, but was in the same orbit. How might its atmosphere differ from what it is now? Be sure to explain your reasoning.

6.2 A blackbody is brightest at a wavelength of 500 nm. At what wavelength would the blackbody be brightest if its temperature were tripled? What if its temperature were halved?

6.3 Suppose there were a planet between Mars and Jupiter at a distance of 3 AU from the Sun. Use figure 7.8 (Fix, p. 131) to estimate its temperature. What are some other factors that might go into determining the actual temperature of this hypothetical planet?

6.4 The half-life of the radioactive isotope ^{90}Sr is 28.1 yr. Have many years need to pass before 99% (or more) of the original radioactive atoms in a sample of ^{90}Sr have decayed away? (The radioactive isotope of Strontium (Sr) mentioned above is produced in atomic bomb explosions. Strontium is an element that is chemically similar to calcium and has entered the food chain where it is deposited with calcium in the bones of growing children.)

6.5 Explain the three ways in which heat can flow and give an example of each.