Problem Set #2

Due Friday, March 7 by 5pm to Dickinson 104

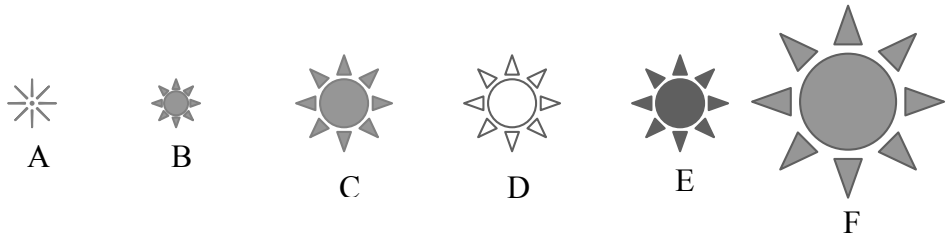
Unless otherwise indicated, all problems come from "The Cosmic Perspective," 8e

1. Problem 5.52 *How Many Photons?*
2. Problem 5.54 *Hotter Sun*
   *Note: Your answer for part (a) should be in terms of **how many times** more (e.g. 10 times more, or 400 times more, etc.). Your answer to part (b) should also be quantitative (e.g. wavelength will be twice as much, or one third as much, etc.)*
3. Problem 5.55 *Taking the Sun's Temperature*
4. *Understanding Light Bulbs* A traditional incandescent light bulb uses a hot tungsten coil to produce a thermal radiation spectrum. The temperature of this coil is typically about 3000K.
   a. What is the wavelength of the maximum intensity for this light bulb? Compare to the 500-nm wavelength of maximum intensity for the Sun.
   b. Overall, do you expect the light from this bulb to be the same as, redder than, or bluer than light from the Sun? Why? Use your answer to explain why professional photographers must adjust their camera settings when shooting indoors vs. outdoors.
   c. Do incandescent light bulbs emit all their energy as visible light? Use your answer to explain why these light bulbs are often hot to the touch.
5. Problem **15.**55 *Calculating Stellar Radii*
6. See attached

Astronomy Ranking Task:
Luminosity of Stars

Exercise #5

Description: The temperature and surface area for six stars (A - F) are given in the table below.



Star	A	B	C	D	E	F
Surface Area	1	1	2	2	2	4
Temperature	1000 K	2000 K	2000 K	3000 K	1000 K	2000 K

Ranking instructions: Rank the luminosity of the stars (A – F) from greatest (brightest) to least (dimmest).

Ranking Order: Greatest 1 ____ 2 ____ 3 ____ 4 _____ 5 _____ 6 _____ Least

Or, all the stars have the same luminosity. _____ (indicate with a check mark)

Carefully explain your reasoning for ranking this way:

_____
_____
_____
_____

Copyright © 2005 Center for Astronomy Education (CAE)
University of Arizona