

Astronomy 115-06, Fall 2007
Homework #3
Due Monday October 29, 2007

SHOW ALL YOUR WORK TO GET FULL CREDIT!

Chapter 6: Review Question (pg. 117)

#17. If the nebula in the image below crosses in front of the star and the nebula and star have different radial velocities, what might the spectrum of the star look like?

Chapter 6: Problems (pg. 117)

#1. Human body temperature is about 310°K (98.6°F). At what wavelength do humans radiate the most energy? What kind of radiation do we emit?

#8. To which spectral classes do these stars belong, according to their spectral features?

- a. Medium-strength Balmer lines, strong helium lines
- b. Medium-strength Balmer lines, weak ionized-calcium lines
- c. Strong Ti-O bands
- d. Very weak Balmer lines, strong ionized-calcium lines

#9. In a laboratory, the Balmer beta line has a wavelength of 486.1 nm. If the line appears in a star's spectrum at 486.3 nm, what is the star's radial velocity? Is it approaching or receding (moving towards or away from us)?

Chapter 7 Problems (pg. 141)

#7. Use the luminosity of the Sun (the total amount of energy it emits each second) to calculate how much mass it converts to energy each second.

#10. The United States consumes about 2.5×10^{19} J of energy in all forms in a year. How many years could you run the United States on the energy released by the solar flare in Problem 9 (energy of 10^{25} J)?

Chapter 8 Review Question (pg. 167)

#5. Why does the luminosity of a star depend on both its temperature and its radius?

Chapter 8 Problems (pg. 167)

#11. If two stars orbit each other with a period of 6 years and a separation of 4 AU, what is their total mass? (Hint: see Reasoning with Numbers 8-4 on page 155.)

#14. What is the luminosity of a 4-solar-mass star? Of a 9-solar-mass star? Of a 7-solar-mass-star?

Chapter 9 Review Question (pg. 195)

#12. Why is there a lower limit to the mass of a main-sequence star?

Chapter 9 Problem (pg. 195)

#9. What is the life expectancy of a 16-solar-mass star?