Astronomy 1050
Stars Unit
Astronomy Notes Review Questions

Chapter 11, Section 12

4. What is the grouping of stars by spectral type based on?
8. What are the 7 basic spectral types in order of temperature (hottest to coldest)?
9. If our Sun has a surface temperature of 5840 K, how many times hotter than the Sun is the hottest O-type star? How many times cooler than the Sun is the coolest M-type star?
10. What fraction of the stars are main sequence stars?
11. What is the range of temperatures found on the surface of main sequence stars?
12. What is the range of luminosities produced by main sequence stars? Compare them to the Sun (Watts are ridiculously small energy units to use).
13. What is the range of diameters for main sequence stars? Compare them to the Sun (miles and kilometers are ridiculously small length units to use). Red giants, supergiants, white dwarfs are not main sequence stars.
14. What is the trend in the stellar diameters vs. temperature for main sequence stars? (As temperature increases, the diameter ___________.)
15. What is the trend in the stellar luminosities vs. temperature for main sequence stars? (As temperature increases, the luminosity ___________.)
17. What is the range of stellar masses for main sequence stars? Compare them to the Sun (pounds and kilograms are ridiculously small mass units to use).
18. What is the trend in the stellar masses vs. temperature for main sequence stars? (As temperature increases, the mass ___________.)
19. What is the trend in the stellar masses vs. luminosity for main sequence stars? (As luminosity increases, the mass ___________.)

Chapter 11, Section 15

1. How it is known that luminosity and temperature are correlated for about 90% of the stars?
2. Where are luminous and faint stars plotted in the H-R diagram (color-magnitude diagram)? Where are cool and hot stars plotted?
3. Where are red giants, main sequence stars, and white dwarfs plotted in the H-R diagram?
4. Which main sequence stars are hotter and which are cooler? Which ones are more massive and which ones are the lightweights?

5. Which main sequence stars are bigger in diameter than others? How can we tell that they are bigger?
6. What is the relation between stellar luminosity and stellar mass?
7. Which spectral classes are more common than others? How do you know without having to survey the entire galaxy?

Chapter 13, Section 8

1. What fundamental property of stars determines their evolution?
2. Why do massive stars last for a short time as main sequence stars but low-mass stars last a long time in the main sequence stage?
5. What is happening in the core of a main sequence star and why is it so stable?
6. What happens to a main sequence star that has stopped fusing hydrogen in its core?
7. Are all red giants or supergiants very massive stars? Why are red giants so big and red? What is going on inside the giants?
8. What is the evolution sequence for stars around the mass of our Sun? How long is the Sun's main sequence lifetime?
9. What will happen to a hot, blue star ($>$ 10 solar masses) during its entire lifetime?
10. What will happen to a cool, red star ($<$ 0.5 solar masses) during its entire lifetime?
12. How is a planetary nebula formed? What is formed at the center of the planetary nebula? Which main sequence stars will eventually form planetary nebulae?
13. What happens in a supernova explosion? Which main sequence stars will eventually go supernova?
16. How does the concept of stellar nucleosynthesis explain where all of the elements on the Earth came from?
17. Why is iron the limit for stellar nucleosynthesis in red giants? Where did heavier elements than iron come from?

Chapter 13, Section 9

1. How do cluster H-R diagrams confirm the stellar evolution models?
4. How do you know that a cluster with a MST of 3 solar masses is younger than a cluster with a MST of 2.8 solar masses and older than a cluster with a MST of 3.2 solar masses?

Chapter 13, Section 14

1. What type of star will become a white dwarf? Describe the characteristics of a white dwarf.
2. How does electron degeneracy pressure keep the white dwarf from collapsing any further?

3. What is the upper bound for the mass of a white dwarf? How would the fact that stars up to 5 solar masses become white dwarfs show that stars lose mass to the interstellar medium as they evolve? How is most of this mass lost?
4. How is a neutron star created? What type of star will become a neutron star? Describe the characteristics of a neutron star.
5. How does neutron degeneracy pressure keep the neutron star from collapsing to a point at the center?
6. What is the upper bound for the mass of a neutron star?
10. What type of star will become a black hole? Does anything keep it from collapsing to a point at the center? Describe the characteristics of a black hole.
11. What is the sole determining thing that specifies the size of the event horizon?

Chapter 11, Section 12

1. How do you use the light curve to find the diameters of stars?
2. What special type of binary star system is used to find the diameters of stars?
3. Use the light curve in the figure in the section above. Assume that when star A is behind star B, the small dip in brightness is seen. When star B is behind star A, the big dip in brightness is seen. Which star is more luminous?
4. From the previous problem, if t1 = 45 minutes, t2 = 60 minutes, t3 = 105 minutes, t4 = 120 minutes, what is (star A diameter)/(star B diameter)? [Hint: find which star is brighter and in this circular orbit system (t8 - t6) = (t4 - t2).]
5. From the previous problem, if the velocity is 750 kilometers/second, what is the diameter of the larger star?
6. The white dwarf Sirius B has a temperature of 14,000 K and a luminosity only 0.00794 times the Sun's luminosity. What is the diameter of Sirius B in kilometers? (The Sun's radius = 696,000 kilometers.)