

29:50 Stars, Galaxies, and the Universe

Instructor: Spangler

Homework Assignment # 6

October 12, 2010

Note: Corresponding quiz on ICON must be completed by 8AM, Monday, October 18

1. The mass of the star Spica (the brightest star in the constellation Virgo) is 8 solar masses. What is its Main Sequence lifetime? In other words, when a new star like Spica forms, how long will it last as a Main Sequence star? **Hint:** If you are comfortable with equations, this is a good one to use them on.
 - (a) 10 billion years
 - (b) 2.5 billion years
 - (c) 500 million years
 - (d) 50 million years
 - (e) 5 million years
2. The mass of the star Spica (the brightest star in the constellation Virgo) is 8 solar masses. What is its luminosity in units of the solar luminosity (L_{\odot})
Hint: If you are comfortable with equations, this is a good one to use them on.
 - (a) $7500 L_{\odot}$
 - (b) $1450 L_{\odot}$
 - (c) $1.5 L_{\odot}$
 - (d) $0.010 L_{\odot}$
 - (e) $8 L_{\odot}$
3. What physical process is responsible for generating the Sun's power?
 - (a) nuclear fusion of hydrogen nuclei to produce helium
 - (b) nuclear fusion of helium nuclei to produce carbon
 - (c) nuclear fusion of silicon nuclei to produce iron
 - (d) nuclear fission of uranium nuclei
 - (e) nuclear fission of plutonium nuclei
4. Which of the following equations is crucial in explaining the effectiveness of the cycle responsible for generating the Sun's power?
 - (a) $E = hf$
 - (b) $F = ma$
 - (c) $\lambda = h/p$
 - (d) $P^2 = a^3$
 - (e) $E = mc^2$

5. Consider a Main Sequence star of spectral class M5. Approximately what is its luminosity in units of the solar luminosity?
- (a) $7500 L_{\odot}$
 - (b) $1450 L_{\odot}$
 - (c) $1.5 L_{\odot}$
 - (d) $0.010 L_{\odot}$
 - (e) $8 L_{\odot}$
6. The star Alkaid (Eta in Ursa Major, the star at the tip of the handle in the Big Dipper) has a luminosity of $488 L_{\odot}$ and a surface temperature of 16,150 K. What kind of star is it?
- (a) a Main Sequence star cooler than the Sun
 - (b) a Main Sequence star hotter than the Sun
 - (c) a Giant star cooler than the Sun
 - (d) a Supergiant star hotter than the Sun
 - (e) a White Dwarf star
7. Of the following 5 star clusters, which is the *youngest* (i.e. formed most recently from the interstellar medium)? **Hint:** You obviously can't just think up the answer to this, you need to consult a source of information (**not** Wikipedia).
- (a) M44, the Praesepe cluster
 - (b) the Hyades
 - (c) the Pleiades
 - (d) M67
 - (e) M3
8. Of the following 5 star clusters, which is the *oldest* (i.e. formed the longest time ago from the interstellar medium)? **Hint:** You obviously can't just think up the answer to this, you need to consult a source of information (**not** Wikipedia).
- (a) M44, the Praesepe cluster
 - (b) the Hyades
 - (c) the Pleiades
 - (d) M67
 - (e) M3