29:50 Stars, Galaxies, and the Universe
Instructor: Spangler
Homework Assignment # 4
September 21, 2010

Note: Corresponding quiz on ICON must be completed by 8AM, Monday, September 27

1. Assume interplanetary space travel would have been possible for the last 100 years. What year would have been a bad year to launch a spaceship with humans for a voyage to Mars. **Hint:** this isn't something you can just figure out on your own. Consult figures and diagrams in the book.
   (a) 1975
   (b) 1962
   (c) 1942
   (d) 1958

2. Why would the year you chose have been a bad one for interplanetary travel?
   (a) the Sun stopped shining that year
   (b) Mars was at the most distant point in its orbit that year
   (c) the solar wind was so strong it would have blown the spacecraft off course
   (d) it was a year of solar maximum

3. Which of the following observations indicates that the Sun rotates on its axis?
   (a) sunspots move in circles centered on the middle of the solar disk
   (b) very low sound waves generated by solar rotation are detected in interplanetary space
   (c) sunspots appear to move across the solar disk from east to west
   (d) the Sun is considerably brighter near its north and south pole than at the equator

4. The region of the Sun's atmosphere which corresponds to what we see as the disk of the Sun is called the
   (a) photosphere
   (b) chromosphere
   (c) corona
   (d) convective zone

5. What observed characteristic or phenomenon of the Sun indicates that the temperature below the surface is much higher than that at the surface?
   (a) spicules

(b) filaments
(c) granules
(d) coronal mass ejections

6. During this course, I have repeatedly referred to the star 18 Scorpii, as the "solar twin". Approximately what would you expect the rotation period of 18 Scorpii to be?
(a) 365 days
(b) 1.5 days
(c) 13 years
(d) 25 days

7. When you go to the dentist's office, a beam of x-rays is used to examine the properties of your teeth. Are the wavelengths of the x-rays longer or shorter than the wavelengths of visible light, and by how much?
(a) x-rays have longer wavelengths by a factor of 5 - 75
(b) x-rays have shorter wavelengths by a factor of 2
(c) x-rays have shorter wavelengths by a factor of 10 - 1000
(d) x-rays are not a wave phenomenon, so you can't speak of a wavelength

8. What is the frequency of an electromagnetic wave with a wavelength of about 0.1 meter = 10 centimeters?
(a) 3.0×10^7 Hz
(b) 2.0×10^9Hz
(c) 4.2×10^{-4}Hz
(d) 6.7×10^{15} Hz

9. Over how small a distance does the temperature on the Sun change from that characteristic of the photosphere to that characteristic of the corona? **Note:** this was not discussed in class; you need to study the material in your textbook.
(a) less than a kilometer
(b) 1 - 2 astronomical units
(c) a couple thousand kilometers
(d) 100,000 - 200,000 kilometers