1. (1) Which of the following methods has led to the most discoveries of massive planets orbiting near their parent stars?
   a. Detecting the gravitational effect of an orbiting planet by looking for the Doppler shifts in the star's spectrum
   b. Detecting the light reflected by the planet
   c. Detecting the infrared light emitted by the planet
   d. Detecting the shift of the star's position against the sky due to the planet's gravitational pull
   e. Detecting a planet ejected from a binary star system
2. (1) From laboratory measurements, we know that a particular spectral line formed by hydrogen appears at a wavelength of 121.6 nanometers (nm). The spectrum of a particular star shows the same hydrogen line appearing at a wavelength of 121.8 nm. What can we conclude?
   a. The "star" is actually a planet.
   b. The star is getting colder.
   c. The star is getting hotter.
   d. The star is moving away from us.
   e. The star is moving towards us.
3. (1) True or False: Newton's version of Kepler's third law allows us to calculate the mass of Saturn from orbital characteristics of its moon Titan.
   True
4. (1) What was the name of the star around which the first planet was discovered?
   51 Peg
5. (1) Are the other solar systems that we've found like our own?
   No
6. (1) If you answered yes to #5, name one significant way in which they are similar. If you answered no, name one significant way in which they are different.
   Any of:
   a. *shape of planets orbits*
   b. *size of planets*
   c. *location of planets*
7. (1) Name one way we have verified these discoveries.
   Planetary Transit
8. (3) Use Newton's version of Kepler's third law, $p^2 = \frac{4p^2}{G(M_1 + M_2)}a^3$, to answer the following question. (Hint: The calculation for this problem is so simple that you do not need a calculator.) Suppose a solar system has a star that is four times as massive as our Sun. If that solar system has a planet the same size as Earth orbiting at a distance of 1 AU, what is the orbital period of the planet? Either show work or explain.
   half a year
   G remains the same, and *a* (1 AU) remains the same. The mass changes (four times larger), so the right hand side of the equation becomes 4 times smaller. p^2 must also be four times smaller, so *p* must be half as long or half a year.