Questions to accompany Self Guided Tutorial: Formation of the Solar System (Found in the Mastering Astronomy Study Area section, under "Self-Guided Tutorials" in the left side menu)

These are questions you should have in front of you while you are doing the tutorial. Answer them as you click along.

1) From lesson 1 recap: list the main features of the solar system (there should be 3)

2) From lesson 2: Compare the temperature of the protoplanetary disk at the orbit of Mercury (0.5 AU) and Jupiter (5 AU)

3) From lesson 2: In the protoplanetary disk, where can each substance exist as a solid?

Item	Inner Region (inside .3 AU)	Intermed. Region (.3-3.5AU)	Outer region
Hydrogen/helium			
Hydrogen compounds			
Rocks/metals			

4) From lesson 3: Why don't ices form in the intermediate region of the protoplanetary disk as it cools?

5) From summary: Suppose the solar nebula had been too warm for ices to condense anywhere. If a planet had formed at Jupiter's location, describe how it would most likely appear today?

6) Opinion: The people who do the Mastering Astronomy website are asking us what they can do to improve their online materials. What would you suggest changing about this tutorial to make it more informative and easier to use?

7) Web project: find and then visit the web page for one of the NASA space missions listed in Table 7.3. In addition to the missions listed in Table 7.3, you may choose the Kepler or Corot missions to search for extrasolar planets. Write a 2 paragraph summary of the missions goals, how it will meet those goals (e.g. with what instruments will it make measurements), and the mission's current status. Be sure to find and comment on the web pages where results from the missions are shown (look for images).

8) Estimating the temperature of the protoplanetary disk.

A hydrogen atom falls in from an infinite distance onto a protoplanetary nebula around a star with the same mass as the Sun. Suppose that the atom ends up moving in a circular orbit 1 AU from the star.

By comparing the change in gravitational potential energy (pot. en. at infinite distance minus pot. en. at 1 AU distance from the star) with the kinetic energy that the gas atom has by virtue of its circular velocity around the Sun, calculate the approximate temperature of the gas atom. Note that the average kinetic energy of an atom in a gas in thermal equilibrium is

$$\frac{3}{2}kT = \text{average value of } \frac{1}{2}mv^2$$

and the gravitational potential energy of an object of mass m attracted to a larger object of mass M is

$$-\frac{GMm}{r}$$

where r is the distance between the two objects.