Spring 2015 Name_____Class Section or Time_____

This is your fourth assignment using the *Starry Night* software.

This is due in class by Tuesday, April 7th.

You may turn this in any time prior to the due date. Homework is due at the start of class. **Late homework is not accepted!** If you will be unable to make it to class to turn this in, you must give it to me before the end of class on the day it is due. **It will not be accepted if turned in at the mailboxes in the administration building!**

Remember, although you may discuss these exercises with other students, the work you hand in should be your own. Students who turn in answers which are substantially the same as those of other students will receive between 0 and 50% of the points they would otherwise score.

Exercise B6: Size and Scale of the Solar System

Open the **SkyGuide** pane, and navigate to
Student Exercises > B: The Solar System
> B6: Size and Scale of the Solar System

Question 1a: Go to 1: Terrestrial and inner planets. The four inner planets of the solar system are shown here. Press the "run time forward" button (►) and watch the revolution of the planets. How do their speeds in orbit (how fast they are moving, not the length of time for one orbit) compare to each other?

Question 1b: Set the date to January 1, 2002 (click on the day, month, and year and use the up/down arrow keys on the keyboard). Press the "run time forward" button. Stop the motion the first time Earth passes Mars in its orbit and note the date. Also, use the angular separation cursor to measure the distance between Mars and Earth in AU. (Change the cursor using the menu in the upper left. When you place the angular separation cursor on Mars or Earth, make sure it shows the name of that object and not some distant star in the background.)

Question 1c: Let time run forward again until Earth passes Mars again and note the date.

Question 1d: The time when Earth passes Mars in its orbit is called "opposition" as Mars is in the opposite direction in the sky as the Sun. How long is it between oppositions? Don't just round to years; include months!

Question 1e: Why is the time between oppositions longer than the time for Earth to orbit the Sun once?

Question 1f: At opposition, how will Mars appear to us to be moving in the sky?

Question 2a: Set the date to October 11, 2011. Place the cursor on each terrestrial planet and read out its distance from the Sun or use the angular separation cursor to measure the distance of each of these planets from the Sun. Give the answers in AU.

Question 2b: Run time forward until Venus is passing the Earth. Record the date. Also, Use the angular separation cursor to measure the distance from Venus to Earth in AU.

Question 2c: Which planet gets closest to Earth, Mars or Venus, based on your measurements?

Question 4: Go to 3: The gas giant and outer planets. Use the down arrow button above the main window (▼) to magnify the image until you can see the inner planets' orbits as well as one or two outer planets' orbits. Press the "run time forward" and watch the motion of the outer planets. How does their speed in orbit compare to the speeds of the inner planets?

Exercise C5: The Dwarf Planets

Open the **SkyGuide** pane, and navigate to
Student Exercises > C: The Planets
> C5: The Dwarf Planets

Question 1a: Go to 1: The original dwarf planet. This screen shows the solar system from the side. From the information displayed in the main window, what is one difference between the orbit of the dwarf planet Pluto and the major planets?

Question 1b: Make sure to click on "click here to see another oddity of Pluto's orbit." What else makes Pluto's orbit different from the orbits of the eight major planets?

Question 5a: Go to 3: More dwarf planets. Press the "run time forward" button until Eris reaches perihelion (approximately). Record the date. Also, measure the distance of Eris from the Sun in AU. (In this program, perihelion is indicated by the small tick mark on the orbit, not the two wedges.)

Question 5b: Press "run time forward" until Eris reaches aphelion. Measure the distance of Eris from the Sun in AU.

Question 5c: Press "run time forward" until Eris reaches perihelion again. Record the date.

Question 5d: What is the approximate length of the orbital period of Eris (in years)?

Question 5e: Watch Eris in its orbit. Where is the motion fastest? Why?

Question 5f: Light takes approximately 8 minutes to travel from the Sun to Earth (1 A.U.). Using the distances for perihelion and aphelion you measured, how many minutes does it take for light to reach Eris at perihelion and aphelion? In both cases, write out the mathematical process you are going to perform, but do the actual calculation on a calculator. Finally, divide each of your results by 60 to convert the times to hours.