Spring 2015 Name _____ Class Time_____

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

This is due <u>in class</u> by Tuesday, March 10th.

<u>You may turn this in any time prior to the due date.</u> 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!**

The assignment cannot be done on the internet. The software is located on the computers in room 34-108 on the other side of the courtyard. Hours when the computers are available are posted on my website. The room may be open at other times, but there is no guarantee. If you wish, you may purchase a time-limited, reduced price version of the software. The instructions are listed on the calendar on my website.

You must log in on our computers using the username and password assigned to you by the college. The username is usually *firstname.lastname* and the password is usually your birthday in the format *mmddyy*.

To begin the software, click on the *Starry Night* icon (if present) on the desktop or find *Starry Night College* in the list of programs. Don't check for updates. When the program starts (it takes a while), close the daily hint that is the first thing shown. To begin the assignment, open the ***SkyGuide*** pane. This is opened by clicking on a very small tab about half way down on the left side of the screen. Then click on "Student Exercises" and begin the required assignment. Once the assignment begins, follow along with the instructions. You should work through all the *computer* exercises (ignoring things like writing short stories), but only answer the specified questions on this sheet. **Note: Many of the questions may be changed; read the questions on the homework sheets. Also, there may be additional questions or instructions on the homework sheet that are not listed in the software.**

To answer the questions, you should think about what you are shown in this program; do not go to outside sources for the information!

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.

Note: some questions have been changed and others have been added to those supplied by the program (or left out)!

Lesson A8: The Year and Seasons

Open the **SkyGuide** pane, and navigate to
Student Exercises > A – Earth, Moon and Sun
> A8: The Year and Seasons
and follow the instructions given. Record your answers in the spaces provided.

Question 1a: Go to 1: Earth's orbit. What is the distance from the Earth to the Sun on June 21? Stop the motion of the Earth around that date. Change to the angular separation cursor and measure the distance from the Earth to the Sun in AU. Make sure that the cursor reads "Earth" at the start and "Sun" at the end. Do NOT give the answer for angular separation or position angle in degrees here!

Question 1b: What is the distance from the Earth to the Sun on December 21? Stop the motion of the Earth around that date. Change to the angular separation cursor and measure the distance from the Earth to the Sun in AU.

Question 1c: For us in the northern hemisphere, is the Earth closer to the Sun or farther from the Sun in our winter? Based on that answer, do you think that the distance of the Earth from the Sun is a major contributor to the seasons?

Question 2: What is the percentage change in the distance? (Subtract the answers above from each other, divide by the larger, and multiply by 100.) Show your work. That means to write out the problem that you have to solve, but do your arithmetic on a calculator.

Question 4: Go to 2: Earth's rotation axis. Which of the following statements is correct on June 21?

☐ **a.** The Southern Hemisphere is tilted towards the Sun.
☐ **b.** The Northern Hemisphere is tilted towards the Sun.
☐ **c.** The Southern Hemisphere is titled away from the Sun.
☐ **d.** Both b and c

Question 5: Which of the following statements is correct on December 21? (You can click in the text pane just above question 5 to change the date.)

☐ **a.** The Northern Hemisphere is tilted away from the Sun.
☐ **b.** The Southern Hemisphere is tilted away from the Sun.
☐ **c.** The Southern Hemisphere is tilted towards the Sun.
☐ **d.** Both a and c

Question 6: As the Earth orbits the Sun; observe the tilt and direction of the Earth's rotation axis. Which of the following statements is true? (You can click in the text pane at the appropriate location to move the Earth.)

☐ **a.** The Earth's tilt remains the same and the rotation axis maintains the same orientation.
☐ **b.** The Earth's tilt remains the same but the rotation axis changes orientation.
☐ **c.** Both the angle and orientation of Earth's rotation axis change.
☐ **d.** Earth's degree of tilt changes but the orientation of the axis remains the same.

Question 7: Based on your observations, as the Earth revolves around the Sun:

☐ **a.** The hemisphere tilted towards the Sun experiences summer and the hemisphere tilted away from the Sun experiences winter.
☐ **b.** The hemisphere tilted away from the Sun experiences summer and the hemisphere tilted towards the Sun experiences winter.
☐ **c.** The tilt and direction of the Earth's rotation axis remain constant.
☐ **d.** Both a and c

For the following three exercises (8a, 8b, and 9), you need to measure the height of the Sun in the sky. Do not use the "Gaze" control. This may give you incorrect answers. Instead, make sure you stop the Sun at its highest point and determine its altitude by putting the "angular separation cursor" on the Sun and measuring the angular separation to the horizon (not the position angle). To find the direction, look at the compass directions indicated on the horizon. Note: you may need to use the cursor to drag the view so that you can see in different directions (sunrise, south, sunset). If so, you need to change from the "angular separation cursor" to the "adaptive cursor."

Question 8a: Summer: Go to 3: Concentration of sunlight in summer and winter. Note, I am asking for more than the program asks for!

Complete the following Chart for June 21. You can use the "run time forward" (►) and "stop time" (■) buttons to watch the sun throughout the day. For all charts, use approximate compass points for the directions, such as SE, E, or NE for the position of the Sun at sunrise. For the altitude**,** round off the answer to whole numbers. The Sun is at its highest point when it crosses the meridian line; that is directly south or solar noon. Measure the height of the Sun to the true horizon, not the trees or buildings.

	Direction	**Altitude**	**Approximate Time**
Sunrise		On the horizon 0°	
Sun at its highest point	South		noon
Sunset		On the horizon 0°	

Question 8b: Fall

After the completion of Question 8a: *Summer*, and before clicking to move to December (question 9), find the following additional information. Click on the month in the command bar at the top of the screen, and change the month to September. Use the up or down arrow key to change the month. The day should still be the 21st. Complete the following chart for September 21.

	Direction	**Altitude**	**Approximate Time**
Sunrise		On the horizon 0°	
Sun at its highest point	South		noon
Sunset		On the horizon 0°	

Queston 9a: Winter

Complete the following Chart for December 21. (You can click in the text pane just above question 9 to change the date.)

	Direction	Altitude	Approximate Time
Sunrise		On the horizon 0°	
Sun at its highest point	South		noon
Sunset		On the horizon 0°	

Question 9b: What is the length of daylight (the time the Sun is in the sky) during summer, fall (and spring) and winter? Use your data from the previous three tables.

Question 10: Which of the following statements explains why we experience the annual cycle of seasons?

☐ **a.** Earth's orbit is slightly elliptical.
☐ **b.** The tilt of Earth's rotational axis changes the angle of sunlight hitting Earth's surface.
☐ **c.** The tilt of Earth's rotational axis changes the number of hours of daylight over the seasons.
☐ **d.** Both b and c combine to produce Earth's seasons.

Question 12: Go to 5: Seasons on Mars. Does Mars experience seasons?

☐ **a.** Mars has seasons because its orbit is similar to the Earth's orbit.
☐ **b.** Mars does not have seasons because it is too far from the Sun.
☐ **c.** Mars has seasons because its rotation axis is tilted with respect to the ecliptic.
☐ **d.** Mars does not have seasons because its orbit is not as circular as Earth's orbit.