Name: _____

The Rotating Sky – Student Guide

I. Background Information

Work through the explanatory material on *The Observer*, *Two Systems – Celestial*, *Horizon*, *the Paths of Stars*, and *Bands in the Sky*. All of the concepts that are covered in these pages are used in the Rotating Sky Explorer and will be explored more fully there.

II. Introduction to the Rotating Sky Simulator

- Open the **Rotating Sky Explorer**

The Rotating Sky Explorer consists of a flat map of the Earth, Celestial Sphere, and a Horizon Diagram that are linked together. The explanations below will help you fully explore the capabilities of the simulator.

- You may click and drag either the celestial sphere or the horizon diagram to change your perspective.
- A flat map of the earth is found in the lower left which allows one to control the location of the observer on the Earth. You may either drag the map cursor to specify a location, type in values for the latitude and longitude directly, or use the arrow keys to make adjustments in 5° increments. You should practice dragging the observer to a few locations (North Pole, intersection of the Prime Meridian and the Tropic of Capricorn, etc.).
- Note how the Earth Map, Celestial Sphere, and Horizon Diagram are linked together. Grab the map cursor and slowly drag it back and forth vertically changing the observer's latitude. Note how the observer's location is reflected on the Earth at the center of the Celestial Sphere (this may occur on the back side of the earth out of view).
- Continue changing the observer's latitude and note how this is reflected on the horizon diagram. When the observer is in the northern hemisphere the NCP is seen above the north point on the horizon at an altitude equal to the observer's latitude. When the observer is in the southern hemisphere the SCP is seen above the south point at an altitude equal to the observer's latitude.
- The Celestial Sphere and Horizon Diagram are also linked in that any stars are added to the simulation are shown on both. There are many features related to stars.
    - A star will be randomly created by clicking the **add star randomly** button.
    - A star may be created at a specific location on either sphere by shift-clicking at that location. (Hold down the shift key on the keyboard while clicking at that spot.)
    - You may move a star to any location by clicking on it and dragging it. Note that it moves on both spheres as you do this.

- Note that the celestial equatorial and horizon coordinates are provided for the "active" star. Only one star (or none) may be active at a given time. Simply click on a star to make it the active star. Click on any other location to make no star active.
- If you wish to delete a star, you should delete-click on it. (Hold down the delete key on the keyboard while clicking on the star.)
- You may remove all stars by clicking the **remove all stars** button.
- ***Note that stars are the vehicle by which you make coordinate measurements. If you want to make a measurement in either diagram – you place the active star at that location.***

- There are several modes of animation as well as a slider to control speed.
  - You may turn on animate continuously or for preset time intervals: 1 hour, 3 hours, 6 hours, and 12 hours.
  - If you click-drag a sphere to change its perspective while the simulator is animating, the animation will cease. Once you release the mouse button the present animation mode will continue.
- This simulator has the power to create star trails on the horizon diagram.
  - A series of check boxes set the star trails option. **No star trails** is self-explanatory. **Short star trails** creates a trail behind a star illustrating its position for the past 3 hours. **Long trails** will trace out a parallel of declination in 1 sidereal day.
  - Stars are created without trails regardless of the trail option checked. If either short or long trails is checked, the trail will be drawn once the simulator is animated.
  - Existing star trails will be redrawn in response to changes – the star being dragged on either sphere or changing the observer's location.
  - What's not in this simulation? – the revolution of the Earth around the sun. This simulator animates in sidereal time. One sidereal day (one 360° rotation of the earth) is 23 hours and 56 minutes long. You should think of this simulator as showing the Earth isolated in space as opposed to revolving around the sun.