Classroom Demonstration Guidelines
(Rotating Sky Explorer)

The following sequence of directions are steps an instructor might choose to follow in demonstrating the Rotating Sky Explorer in a classroom situation. We provide these suggestions with appropriate questions (shown in bold italics) to pose to the class as an aid in promoting interactivity. We encourage instructors to adapt these suggestions to their particular educational goals and the needs of their class.

Animation Demonstration Directions	Interactive Questions
Start the simulation and begin explaining to students how the three views are linked together – Your location on the map determines what part of the celestial sphere you can see in the horizon diagram.	Note that you are at a latitude of approximately 41º N. ***Where does an observer in this horizon system see the NCP?*** (at an altitude of 41º and azimuth of 0º - above the north point on the horizon)
Note that you can illustrate this by shift-clicking to create a star and dragging it to this location.	***How can one specify the intersection of the observer's meridian and the celestial equator?*** (Azimuth = 180º, Altitude = 90-lat = 49º)
Drag observer (or use the up and down arrow keys) to demonstrate.	***How will the location of the pole change in the horizon diagram as the observer moves to more southerly latitudes****?* (the NCP will move to progressively lower altitudes until it moves below the horizon when the observer is in the southern hemisphere and the SCP becomes visible.)
Change the **latitude** back to 41º N. Shift-Click the north point of the horizon to create a star there and then click somewhere else to remove the focus.	***Where will this star be in 6 hours due to rotation?*** (in the eastern part of the sky -- students will likely have difficulty answering this question)
Check **long star trails**. Select **for 6 hours** from the animate pull down menu and then click **start animation** to demonstrate.	***Where will this star be in another 6 hours due to rotation?*** (on the observer's meridian high in the sky)
Click **start animation** again to illustrate this.	***Will this star ever dip below the horizon?*** (No) ***What is that type of star called?*** (circumpolar -- or never set)
Click **start animation** twice more to complete the star trail for this star.	***If I increase the declination of this star will it still be circumpolar?***(yes) ***If I decrease the declination of this star will it***

Illustrate this by dragging the star on the celestial sphere. If you decrease the star's declination the star trail will dip below the horizon while if you increase the declination the star trail ring moves nearer the NCP. Click **remove all stars**. Create a new star at the east point on the horizon. Click **start animation** to illustrate this. Click **start animation** to illustrate this. Click **remove all stars** and check **show circumpolar region**. Drag the observer up to the north pole so students can see the expanding circumpolar region. Drag the observer down to the equator. Uncheck **show circumpolar region** and check **show rise and set region** to illustrate this. Uncheck ***show rise and set*** region.	***still be circumpolar?***(no) ***Where will this star be in 6 hours due to rotation?*** (on the observer's meridian) ***Where will this star be in another 6 hours?*** (on the west point of the horizon) ***Will this star every dip below the horizon?*** (Yes) ***What is that type of star called?*** (a rise & set star) ***If we increase the latitude of the observer, will the number of circumpolar stars increase or decrease?*** (increase). ***What is the circumpolar region from the north pole?*** (all stars above the celestial equator) ***What is the circumpolar region from the equator?*** (No stars – all stars are rise & set) ***Are there any stars that you can't see from the equator?*** (No – you can see them all – at least theoretically)
Click **add star randomly** until about 20 stars have been created. Click **start animation** in animate **continuously** mode with **long star trails** checked. Let the animation run until complete trails have been completed for all stars. You should still be at the equator.	***What do star trails look like when our observer looks north?*** (Counter clockwise circles about the NCP which at the north point on the horizon.) Remind students that they need to imagine that they are looking from the perspective of the stick figure. ***What do star trails look like when our observer looks east?*** (Lines perpendicular to the horizon.)

Drag the observer to the north pole.	***What do star trails look like when our observer looks south?*** (Lines parallel to the horizon.) ***Does it matter in which direction the observer looks?*** (No.)
Drag the observer back to a latitude of 41ºN.	***What do star trails look like when our observer looks north?*** (Counter clockwise circles about the NCP which is above the north point at an altitude of 41º)
Manipulate perspective as needed.	***What do star trails look like when our observer looks south?*** (Lazy circles – the center is far below the horizon. ***What do star trails look like when our observer looks east?*** (Lines angled with the horizon.)
Check **show celestial equator** and **show the angle between the celestial equator and the horizon**. Change the observer's latitude slowly and have students note that changing value of this angle. It is very easy to show that the angle is zero at the north pole and 90º at the equator	***What is this angle?*** (49º) ***Can you express a general rule for this angle as a function of latitude?*** (the angle is 90-lat.)