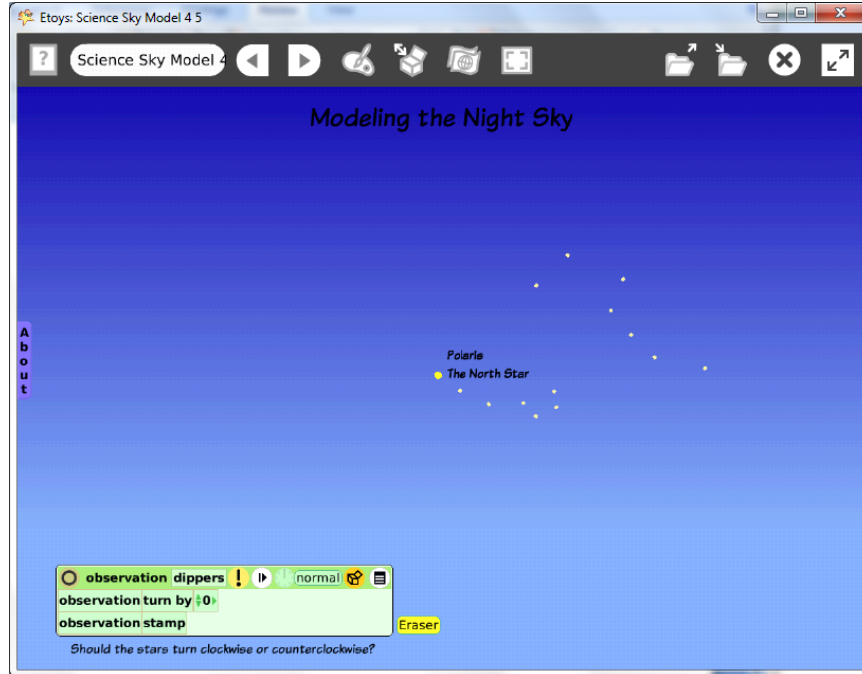


Science Modeling and Visualization Fourth – Fifth Grade Levels



Introduction:	This lesson introduces using the computer to visualize the apparent clockwise rotation of the Earth by modeling the motion of two familiar asterisms: the Big Dipper and the Little Dipper. These asterisms can be found the constellations Ursa Major and Ursa Minor. Polaris, the North Star is in the Little Dipper. The example is a project of the two asterisms that were drawn as part of the K-1 Technology Passport. Students may redraw their examples or use the ones they did when they were younger. The technology makes it easy to try many ideas.
Topic:	Students write a script to make their drawing turn on the computer screen, change the center of rotation and leave a trail that will look very similar to time lapse photographs of the night sky.
Subject:	Science
Time:	Lesson 1 Two labs
Description:	Students will use Etoys scripts to experiment with virtual representations of objects they are studying in science. Modeling

	allows us to experiment with things too large, too small, too expensive or too alive. The lesson introduces a vocabulary of words common in science, mathematics, and everyday experience.
Vocabulary:	asterism, Little Dipper, Big Dipper, constellation, Ursa Major, Ursa Minor, Polaris, center of rotation, x- y, axis, y-axis, clockwise, counter clockwise, apparent, actual
Evaluation Criteria:	<p>Draws the two asterisms: Big Dipper and Little Dipper in proportional relationship to each other on the screen</p> <p>Knows the difference between an asterism and a constellation</p> <p>Knows Ursa Major and Ursa Minor are constellations</p> <p>Marks the location of Polaris in the Little Dipper</p> <p>Writes a script that turns the asterisms on the screen</p> <p>Can find the center of rotation of the two asterisms</p> <p>Can move the center of rotation to Polaris</p> <p>Can compare the result of adding a ‘stamp’ tile to the turn script and time lapse photography of the night sky</p> <p>Experiments independently and applies basic knowledge and common sense</p> <p>Records results and states conclusions</p>
Teacher Information:	<p>Use Etoys Quick Guides if the lesson mentions unfamiliar tools or techniques. Give students time to read them too.</p> <p>Etoys Quick Guides: Click the question mark in Etoys to open the set of tutorials about basic tools and techniques.</p> <p>Etoys Quick Guides: Click the question mark in Etoys to open the set of tutorials about basic tools and techniques.</p>
Goals:	<p>Students use Etoys scripts to make an object move on the screen and explore modeling the apparent motion of the night sky.</p> <p>Students explore applications of positive and negative numbers.</p>
Lesson 1: Two labs	<p>Students use a sky map to identify the Little Dipper and the Big Dipper. They can find and label Polaris, the North Star.</p> <p>Supplies: Paint Tools</p> <p>Students draw these two asterisms with one paint tool.</p>

<p>Halo Handles: Viewer</p> <p>Supplies: Text</p> <p>Script Tiles: Turn by Script Tiles: Stamp</p> <p>Script Tile: Pen Use</p> <p>Navigator Bar: Keep Find Projects</p>	<p>Move the center of rotation of the drawing so that it is exactly on Polaris.</p> <p>Type the name Polaris the North Star and put it near the correct star.</p> <p>Open a Viewer for the drawing and make a script with a turn by tile. Add a stamp tile to the script.</p> <p>Make another script with clear all pen trails. Click on the exclamation mark to run a script once.</p> <p>Use the world's Viewer to change the background color; choose fill and border. Experiment with all four tiles in this category.</p> <p>Discuss whether the turn by value should be a positive or negative number. Students can think about how the Earth rotates, where the sun rises and sets and apply their knowledge. Have students choose positive or negative as they have conjectured/know. Start and stop the scripts. Look at their neighbor's screen and see if all of the stamped images are moving in the same direction. More discussion may be needed. Research for facts.</p> <p>Give students time to experiment a variety of values.</p> <p>Keep the project: namePolaris E.G. katePolaris</p>
<p>Student Information:</p>	
<p>Standards:</p>	<p>Science Illinois State Standards: Late Elementary Science 12F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it. Explain the apparent motion of the sun and stars. Identify easily recognizable star patterns.</p> <p>11A. Know and apply the concepts, principles, and processes of scientific inquiry. Formulate questions on a specific science topic and</p>

choose the steps needed to answer the question.
Collect data for investigations using scientific process skills including observing, estimating, and measuring.
Construct charts and visualizations to display data.
Use data to produce reasonable explanations.

12.4.47 Define a constellation as a group of stars that form a pattern in the sky.

Understand that constellations are useful in the study of space because they help create a map of the sky.

Know that locations in the sky are often described using the names of constellations.

Mathematics

Illinois Performance Standards:

Fourth Grade

9A, 9B, 7A 3-D and 2-D shapes

Find common attributes of shapes by exploring rules and directions.

9A Reflection and Symmetry

Fifth Grade

Exponents and Negative Numbers

6A, 6B, 6C Order and compare positive and negative numbers

Addition of positive and negative numbers

Subtraction of positive and negative numbers

Art

National Standards for Art Education Kindergarten-Fourth Grade

Content Standard 6 Making connections between visual arts and other disciplines

National Educational Technology Standards (NETS)

1. Basic operations and concepts

Students are proficient in the use of technology.

2. Social, ethical, and human issues

Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

3. Technology productivity tools

	<p>Students use technology tools to enhance learning, increase productivity, and promote creativity. Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works</p>
Resources:	<p>Etoys Help Quick Guides: Open Etoys and click the question mark in the Navigator Bar to open a set of interactive tutorials that introduce basic tools and techniques.</p> <p>EtoysIllinois.org for projects, tutorials, and lesson plans Squeakland.org for Etoys software</p>
Kh April 9, 2012	