Modelling Motion in the Night Sky

SKILLS MENU

- Questioning
- Hypothesizing
- Predicting
- Planning
- Controlling Variables
- Performing
- Observing
- Analyzing
- Evaluating
- Communicating

The motion of the stars in the night sky is caused by Earth's rotation around its axis and its revolution around the Sun. These are predictable movements. With careful observation, scientists can create models of the motion of celestial objects and predict where these objects will be at a later date. In this investigation, you will construct a planisphere and use it to predict the positions of constellations in the night sky.

Testable Question

Can a star map be used to predict which constellations are visible in the night sky at a certain location and time?

Hypothesis

If the motions of the stars in the night sky are consistent night after night, then we can predict the positions of the constellations in the night sky using an adjustable star map.

Equipment and Materials

- glue stick
- scissors
- copy of a star map
- copy of a star map frame
- two file folders
- split pin

Experimental Design

SKILLS HANDBOOK 3.B.4.

Using the materials listed, you will create a planisphere and use it to locate constellations in the night sky. You should be able to notice the patterns the stars make in the night sky, how they change over the course of a night, and how they change over the course of a year.

Procedure

1. Your teacher will distribute copies of a star map and a star map frame.
2. Glue the star map to one side of a file folder and cut it out.
3. Glue the star map frame to the second file folder so that the spine of the file folder is at the bottom of the frame.
4. Cut around the edge of the star map frame through both layers of the file folder (Figure 1).

Figure 1 step 4

5. Cut out the inside of the star map frame through only the upper side of the file folder, so the backing is still uncut and shows through the inside of the frame (Figure 2).

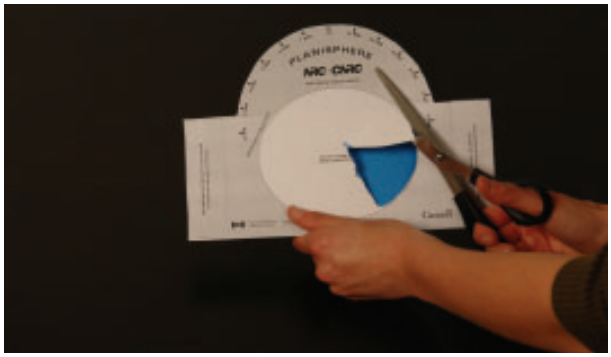

Figure 2 step 5

6. Wrap the tabs around the back of the frame and glue them in place to the backing (Figure 3).

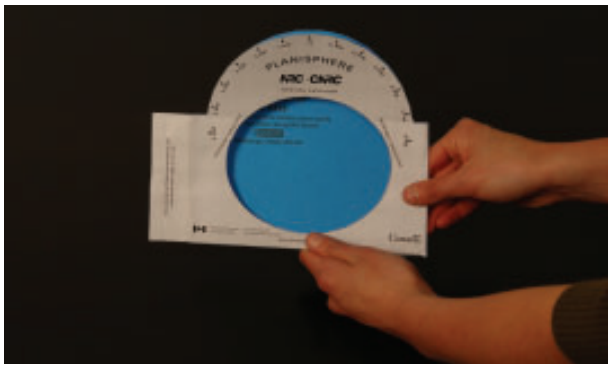

Figure 3 step 6

7. Slide the star map into the frame so that the constellations are visible through the frame (Figure 4).

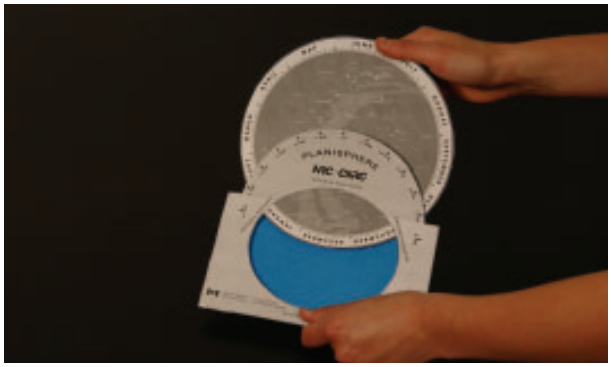

Figure 4 step 7

8. Make a small hole through the star map and the backing at the location of the star Polaris.
9. Insert the split pin through the hole and fasten it so that the map can spin around this point (Figure 5).

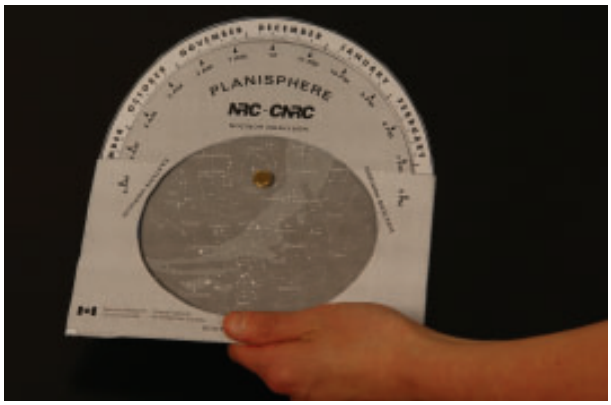

Figure 5 step 9

Analyze and Evaluate

SKILLS HANDBOOK 3.B.6., 3.B.7.

(a) Review the Testable Question and your hypothesis. Explain whether your results support the hypothesis. Remember to state your evidence.

(b) Why do the constellations appear to rotate around Polaris? K/U

(c) Rotate the star map so that April 15 lines up with 8 p.m. Which constellations are visible on the southern horizon? Which ones are directly overhead? T/I

(d) Rotate the star map so that October 15 lines up with 8 p.m. How has the sky changed from your observations of April 15? T/I

(e) Rotate the star map so that today's date lines up with 8 p.m. Slowly rotate the wheel through 9 p.m., 10 p.m., and so on until morning. Describe the change in the position of the constellations throughout the night. C T/I

Apply and Extend

SKILLS HANDBOOK 3.B.6., 3.B.8.

(f) Based on what you learned in Section 8.5, adjust your star map so that it matches the date of the winter solstice. Which constellations are visible on the southern horizon? Do the same for the summer solstice. T/I

(g) Based on what you learned in Section 8.5, adjust your star map so that it matches the date of the vernal equinox. Which constellations are visible on the southern horizon? Do the same for the autumnal equinox. T/I

(h) Rotate the star map so that is matches today's date. Which constellations will be visible tonight in the southern sky at 10:00 p.m.? T/I A

(i) Why is the Sun not on the star map? T/I

(j) Why are the planets not on the star map? T/I

UNIT TASK Bookmark

How can you apply what you learned about using a star map in this section to the Unit Task described on page 446?