STAR FINDING WITH A STAR FINDER

ACTIVITY F-5

GRADE LEVEL: 4-6+

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What's This Activity About?
This activity allows students to create an inexpensive, useful, star chart appropriate for latitudes between 35 and 45 degrees north, which includes most of the continental U.S. These star finders, also known as planispheres because they represent a spherical sky on a paper plane, help students locate constellations visible at any time for any date. They can also be used to reinforce the concept that the sky seems to “change” in a predictable pattern.

What Will Students Do?
Students create a simple star finder, using only scissors, staples, glue, copy masters and a stiff paper manila folder. Students answer questions at the end of the activity to help them understand how the star finder is used.

Tips and Suggestions
- Consider assigning additional questions based on the constellations that are visible at the particular time of year when you do this activity.
- The star wheel will not indicate the positions of dim stars between the more prominent constellations, nor will it show the locations of the planets, which vary continuously. As a follow-up activity, once students have gained proficiency with the star finder, use monthly sky charts from astronomy magazines like Sky & Telescope or Astronomy, which will include more stars, star names, and visible planets.
- Note that many constellations, especially near the southern horizon, will not look as they appear on the flat star finder. The hemispherical sky becomes distorted when compressed to the plane. A constellation like Scorpius, which really does look like a giant scorpion in the southern sky during summer, does not appear in the sky as it is shown on the star finder.

What Will Students Learn?

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Patterns of Change
Models and Simulations
**Star Finding With a Star Finder**

A star map of the night sky helps locate different constellations in the same way a road map helps locate different cities on the earth. In this activity students construct a rotating star finder to find the constellations visible in the night sky throughout the year.

**Concepts**

Constellations remain fixed in their relative position to each other.
Constellations appear in the sky at different times, due to the earth's daily rotation and seasonal orbit around the sun.

**Objectives**

Students will:
- construct a star finder.
- identify constellations using a star finder.
- observe the effect of seasonal changes when viewing constellations.

**Materials**

- Star Finder patterns: holder, and two constellation wheels
- scissors
- file folders (one and one-half per star finder)
- glue
- stapler

**Procedure**

*Advanced Preparation:*

Make enough copies of the Star Finder patterns so each student can make their own. Creating a sample ahead of time will help them understand what the final product should look like.

**Constructing the Star Finder**

1. Distribute one manila folder and the Star Finder Holder pattern to each student.

2. Have students glue the holder pattern to the front of a manila file folder, with the east-south edge of the holder along the fold of the file folder.

3. Have them cut out the star finder as indicated on the pattern, including the central oval. They should staple the front and back together by placing staples exactly on the staple lines shown on the front of the Star Finder Holder.
4. Distribute copies of the constellation wheels and one-half of a manila folder to each student. Glue one of the constellation wheels to one side of the manila folder. Have them cut it out, then glue the other constellation wheel to the back. This technique makes it easier to line up the circle of the two wheels. It is not possible to align the dates on the two wheels, nor is it important for them to be aligned.

5. Have them insert the star wheel between the pages of the holder so the simple star field appears through the oval opening. Once the star wheel is completely inserted, test turn the star wheel to be sure it moves freely. Check to see that the black line under the dates on the star wheel approximately lines up with the edge of the star finder cover showing the time of day.

**Using the Star Finder**

1. Before going outside to use the Star Finder, practice using it in the classroom. Have the students align the current date on the wheel with the time indicator on the holder. The following set of questions and directions will help them become familiar with the star finder.
   a. Assume you are going to observe at 9:00 p.m. tonight. What constellations are visible?
   b. Turn the dial until it is set for 11:00 p.m. tonight.
      1. Which constellations are visible?
      2. Which constellations were visible at 9:00 p.m., but are no longer visible at 11:00 p.m.?
      3. Which horizon are disappearing constellations closest to?
      4. Which constellations are visible at 11:00 p.m., but were not visible at 9:00 p.m.?
   c. Turn the dial until it is set for 5:00 a.m., just around sunrise.
      1. Which constellations are still visible that were up at 9:00 p.m.?
      2. Describe the motion the constellations follow from 9:00 p.m. to 6:00 a.m.
      3. Rotate the dial one complete turn, which represents a 24-hour day. Which constellations never go below the horizon?
   d. Hold the star finder over your head so that the “North” designation on the star finder is pointing north. The stars showing in the oval opening are those that can be seen overhead at the time and date set on the star finder. The edge of the oval represents the horizon. Stars near the edge of the oval are low on the horizon. The center of the oval is the point directly overhead when you look up in the night sky. This point is called the zenith. Stars near the center of the oval will be high overhead when you are observing.
e. Now you are ready to go star finding in the night sky. A small flashlight or penlight will help you read the star finder at night. Red plastic, red construction paper, or a red balloon, over the front of the flashlight will allow you to read your star chart by the red light, but will not reduce your ability to see faint stars in the sky.

**Teachers Note:** Have students practice using their star finders, pointing to where they would expect to find specific constellations.

2. The simple star field shows the bright stars visible in the major constellations. These stars are easily found, especially when viewing from a city where the many lights make it difficult to see faint stars. Once students are experienced at finding the bright stars on this side of the star wheel, they can flip the star wheel over and attempt to find the fainter stars and constellations. Some of these will not be visible until observed from a location away from city lights.

3. Once students become familiar with some of the brighter constellations, they can use them as guides to find your way around the sky. For example, they can use the two outer stars of the Big Dipper's cup to help find the North Star. Have them devise their own technique to use the stars to find other constellations.
STAR FINDER HOLDER

PASTE ONTO FOLDER, ALIGNING THIS EDGE WITH FOLDED SPINE OF FOLDER.
THEN CUT ALONG EDGE OF STAR FINDER, BUT DO NOT CUT FOLDED EDGE!

STANDARDized TIMING: STAR FINDER IS FACING NORTH. THE STARS SHOWN IN THE OPENING ARE THOSE THAT CAN BE SEEN OVERHEAD.

TO USE: TURN THE STAR WHEEL UNTIL THE CURRENT DATE LINE UP WITH THE TIME YOU WISH TO OBSERVE. HOLD THE STAR FINDER OVER YOUR HEAD SO "NORTH" ON THE STAR FINDER IS FACING NORTH. THE STARS SHOWN IN THE OPENING ARE THOSE THAT CAN BE SEEN OVERHEAD.

CUT OUT WHITE OVAL (THIS SIDE OF FOLDER ONLY).

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STAR WHEEL
Complex Star Field

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