

Star Finding with a Star Finder



Activity F3

Grade Level: 4–6+

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What’s This Activity About?

This activity allows students to create an inexpensive but useful star wheel, 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. See the Resource Guide *Observing the Night Sky* (5.11) in *The Universe at Your Fingertips*.
- 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. Or, again, see the Resource Guide recommended above.
- 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 exactly as it is shown on the star finder, but the stars higher in the sky do form easily recognizable patterns.

What Will Students Learn?

Concepts

- Rotation of the sky during the year

Inquiry Skills

- Observing
- Using instruments

Big Ideas

- Patterns of Change
- Models and Simulations

Lesson 2: 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 you locate different cities on Earth. In this activity students construct a rotating star finder to find the constellations visible in the night sky throughout the year. Your latitude affects the stars visible in your night sky. This Star Finder works well for most locations in the continental U.S.

Concepts

Constellations remain fixed in their relative position to each other. Constellations appear to change their positions in the sky throughout the night due to the Earth's daily rotation.

Objectives

Students will:

- construct a Star Finder;
- identify constellations using a Star Finder; and,
- observe the effect of the Earth's rotation when viewing constellations.

Materials

- Star Finder patterns: holder, and two constellation wheels
- Scissors
- Stapler
- File folders (one and one-half per Star Finder)
- Glue
- Astronomy Notebooks

If continuing this activity into nighttime viewing, you will want the following

- Binoculars
- Flashlight (covered with red balloon or red plastic if possible)
- Clear night sky

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.

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 along the dotted lines 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. Have them glue one of the constellations wheels to one side of the manila folder and cut out the wheel. 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 stapled pages 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. The following set of questions will help students become familiar with how the Star Finder operates.
 - a. Set the Star Finder to show the sky for 9 p.m. today. Today's date should be next to 9:00 p.m. What constellations are visible?
 - b. Turn the dial until it is set for 11 p.m. tonight:
 - What constellations are visible?
 - Which constellations were visible at 9 p.m., but are no longer visible at 11 p.m.?
 - Which horizon is closest to the disappearing constellations?
 - Which constellations are visible at 11 p.m., but not at 9 p.m.?
 - c. Turn the dial until it is set for 6 a.m., just around sunrise.
 - Which constellations are still visible that were up at 9 p.m.?
 - Describe the motion the constellations follow from 9 p.m. to 6 a.m.

Teacher Note: When we discuss “the movement of the constellations” you should recognize that we are referring to the apparent movement caused by the rotation of Earth on its axis. The cause of the apparent movement should be reinforced with students, as our language often leads to the misconception that stars (and everything else in the sky) are moving around us.

- d. Adjust the Star Finder so it is again set for 9:00 p.m. tonight. Remember that the Star Finder is based on standard time. Subtract one hour from clock time to get standard time if Daylight Saving Time is in effect. 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, so 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. A red balloon or red plastic over the front of the flashlight will allow you to read your sky chart by the red light, but will not reduce your ability to see faint stars in the sky.
2. The simple star field contains only 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 you observe 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 their 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 ways to use the stars to find other constellations.

Evaluation

Once students have had a chance to try their Star Finders, have them respond to one of the following writing prompts in their Astronomy Notebooks. They should be allowed to use their Star Finders as a tool to develop their responses.

1. After using your Star Finder for a long time, you would become acquainted with where certain constellations are located in the sky. On a camping trip you have forgotten to bring your Star Finder but you still can find certain major constellations like Ursa Major that contains the Big Dipper. Knowing where Ursa Major is, describe how you could use this knowledge to find Bootes, a nearby constellation.
2. You are talking with a friend on the phone at about 10 p.m. in the middle of October. She says she can see the Big Dipper while standing on her back porch. You tell her she should also be able to see Cygnus, the swan constellation. Describe for your friend what Cygnus looks like and where it is in the sky by using the Big Dipper to locate the constellation.

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!

Place this side along folding edge of folder.



Star Wheel – Simple Star Field

