

# Constellations: Stories in the Sky

## BROWARD COUNTY ELEMENTARY SCIENCE BENCHMARK PLAN

### Grade 5—Quarter 3

#### Activity 30

##### SC.E.2.2.1

*The student knows that, in addition to the Sun, there are many other stars that are far away.*

##### SC.H.1.2.3

*The student knows that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions.*

##### SC.H.1.2.5

*The student knows that a model of something is different from the real thing, but can be used to learn something about the real thing.*

##### SC.H.2.2.1

*The student knows that natural events are often predictable and logical.*

## ACTIVITY ASSESSMENT OPPORTUNITIES

The following suggestions are intended to help identify major concepts covered in the activity that may need extra reinforcement. The goal is to provide opportunities to assess student progress without creating the need for a separate, formal assessment session (or activity) for each of the 39 hands-on activities at your grade.

1. Remind students that constellations appear to change location from hour to hour, night to night, and season to season. Ask them what could explain the apparent motion of constellations in each of these cases. (From hour to hour, the constellations appear to move in the night sky because of the Earth's rotation on its axis. From day to day and from season to season, the constellations appear to change location because the Earth is moving in its orbital path around the Sun.)
2. Use the Activity Sheet(s) to assess student understanding of the major concepts in the activity.

In addition to the above assessment suggestions, the questions in bold and tasks that students perform throughout the activity provide opportunities to identify areas that may require additional review before proceeding further with the activity.



# Constellations: Stories in the Sky

## OBJECTIVES

In this activity students identify several of the constellations in the night sky. They make models of some of them and then write their own stories about how certain constellations might have gotten their names.

### The students

- ▶ observe seasonal changes in the position of constellations as viewed from Earth
- ▶ construct constellation models and identify several constellations
- ▶ write a fictional story about the origin of a constellation

## SCHEDULE

About 50 minutes

## VOCABULARY

**Big Dipper (Ursa Major, or Great Bear)**  
**Cassiopeia**  
**Cepheus**  
**constellation**  
**mythology**  
**Orion (The Hunter)**

## MATERIALS

### For each student

- 1 Activity Sheet 30, Parts A and B
- 1 pr safety goggles\*

### For each team of two

- 1 cardboard square, 30 cm × 30 cm
- 1 push pin
- 1 pair scissors\*



- transparent tape\*
- 1 tube, cardboard

### For the class

- 1 cardboard square
- 1 sheet Constellation Patterns
- 2 btls glue
- 2 light bulbs
- 2 light sources
- 1 overhead projector\*
- 1 sheet paper, construction, black
- 1 push pin
- 1 pair scissors\*
- 4 transparencies (Fall Sky, Spring Sky, Summer Sky, Winter Sky)
- 1 tube, cardboard

\*provided by the teacher

## PREPARATION

- 1 Make a copy of Activity Sheet 30, Parts A and B, for each student.
- 2 Make seventeen copies of the Constellation Patterns, one for your demonstration model and one for each team.
- 3 Cut the sheet of black construction paper into 4-cm (about 1.6-in.) squares.
- 4 **Viewer Setup:**
  - Partially prepare a demonstration viewer. Cut out one of the (reverse) constellation patterns, including its number.
  - Place it with the pattern side up in the center of a square of black construction paper and tape it in place temporarily with tiny pieces of transparent tape. With the cardboard square beneath the

paper, punch out the pattern with a push pin through the black paper.

- Then put several beads of glue around one end of a cardboard tube. Place the square of black construction paper on the end with the glue, patterned side up. Stand the tube on the patterned end until the glue dries. Finally, remove the tape and the pattern from the black paper.

**5** Screw the bulbs into the light sources and choose two areas in the classroom where teams can share a light source. Have extension cords handy in case they are needed.

**6** Each team of two will need one cardboard square, one push pin, one cardboard tube, one square of black construction paper, one copy of the Constellation Patterns, scissors, transparent tape, and access to the glue.

## BACKGROUND INFORMATION

Myths are stories passed down from ancient times. They depict both real and fictitious events, persons, and animals. Myths serve to recall significant events in the past or to explain people's practices, beliefs, or natural phenomena. **Mythology** is the study of myths.

Myths often involve the supernatural. When people did not know how to explain many natural events (earthquakes, eclipses, the changing seasons, and so on), they often attributed them to actions of beings who, they believed, resided in the sky. Patterns of stars that are visible in the night sky were often incorporated into the myths to represent certain beings and objects people thought were responsible for those mysterious events.

To create their sky-pictures, people somewhat arbitrarily grouped certain stars into patterns we now call **constellations**. Although constellations may comprise stars that are thousands of light-years apart,

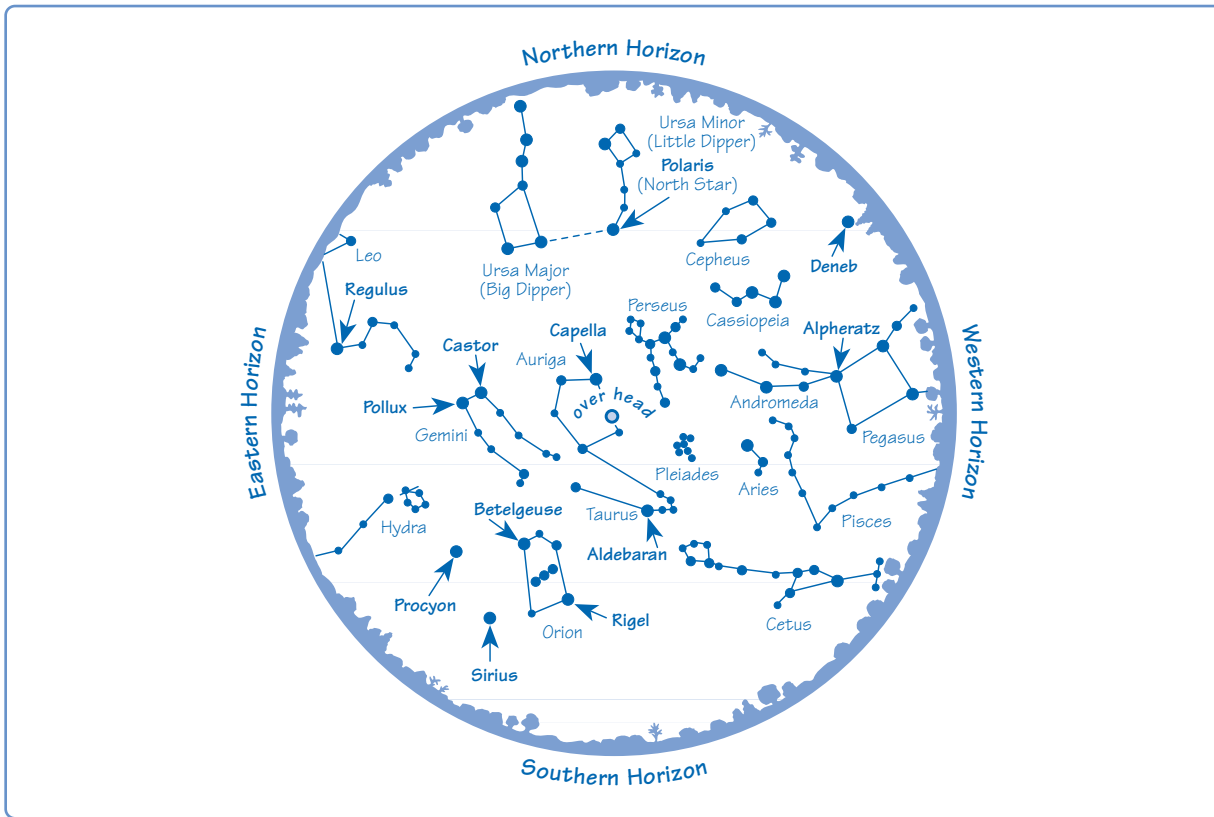
they appear to be on the same plane when viewed from Earth. Many of the 88 constellations we recognize today were originally named and described by the Greeks many centuries ago.

Some of the better-known constellations today are Aquarius, the **Big Dipper** (Ursa Major, or Great Bear), **Cassiopeia**, **Cepheus**, the Little Dipper (Ursa Minor, or Little Bear), and **Orion** (The Hunter).



## Guiding the Activity

## Additional Information



▲ Figure 30-1. The night sky in winter.

Point out the names of two of the stars that make up this constellation—Betelgeuse and Rigel. Ask, **Are these stars the same distance from Earth?**

*No. Betelgeuse is 500 light-years away and Rigel is almost 1,000 light-years away.*

Tell students that comparing stars' brightness is not a good indication of their relative distance from Earth. Even though the two stars in this constellation appear to be about the same distance away from us, their distances from Earth are actually light-years apart.

3

Begin a discussion of how constellations got their names. Tell students that many constellations were named after imaginary characters, animals, and objects. A constellation might represent a swan, a ram, a fish, a big bear, a little bear, and so on.

## Guiding the Activity

Write the word *mythology* on the board. Explain that **mythology** is the study of myths, which are stories from ancient times. These stories tell of real and imaginary (even supernatural) events, persons, and animals.

4

Remind students that there are four seasons in a year—spring, summer, fall, and winter. Display the overhead transparency of the constellations of the night sky in spring. Locate the Big Dipper (Ursa Major), near the center of the transparency, and trace the constellation's shape with your finger.

Identify this constellation as the **Big Dipper** and point out that it is shaped like a long-handled cup that is used to dip up water for drinking.

Next, display the transparency showing the night sky in summer. Point out that the Big Dipper is in a different part of the sky during this season.

Explain to students that the stars making up a constellation always form the same shape but that from our viewpoint on Earth their positions in the night sky change through the year.

Ask, **What do you know about Earth's orbit around the Sun that could explain why this happens?**

Tell students that Earth's revolution around the Sun causes our view of the night sky to change through the seasons, until constellations return to their original positions after an entire year.

Identify several other constellations, such as **Cepheus** in the summer sky and **Cassiopeia** in the transparency of the night sky in fall.

Explain that there are more than 88 other recognized constellations and that almost every one has its own story based on myth.

## Additional Information

*Students may have heard of Hercules, a mythological hero with supernatural strength.*

*Make sure all students are able to see and identify the shape of the constellation.*

*Encourage answers that indicate that students are familiar with the concepts of Earth's revolution around the Sun and the enormous distance it travels in one orbit.*

*Earth's rotation causes the stars to appear to make a complete circle around the planet once a day.*

## Guiding the Activity

### Additional Information

**5** Tell students that they will make their own constellation viewers. Ask for their attention while you demonstrate how to assemble one.

Show them your demonstration tube with the paper square glued to it. Tell teams they will each cut out one of the constellation patterns, including its number, place it over a square of black construction paper, and tape it in place temporarily with tiny pieces of transparent tape. Tell them they will then place the piece of paper on the cardboard square and punch out the pattern with a push pin through the black paper.

Next, they will put several beads of glue around one end of a cardboard tube and then place the square of black construction paper on the end with the glue, patterned side up. They should then stand the tube on the patterned end until the glue dries. Finally, they should carefully remove the tape and the pattern from the black paper.

Choose one of the reverse constellation patterns. Show students how to lay the pattern face-up on the black construction paper and, using the cardboard as a base, poke holes with the push pin through the dots on the pattern and through the black construction paper.

Tell students that they are to find the number that appears next to each pattern and write it on the tube. Explain that the number will be used later to identify the name of the constellation.

*Some students may notice that the constellation pattern is reversed. Tell them this is necessary so that the pattern will have the correct orientation when viewed through the tube.*

## Guiding the Activity

- 6 Give a copy of **Activity Sheet 30, Part A**, to each student. Distribute a cardboard square, a push pin, a cardboard tube, a square of black construction paper, a copy of the Constellation Patterns, transparent tape, and scissors to each team of two. Have each team gather around one of the two light sources.

Assign each team one of the four constellation patterns to cut out and use for their viewers.

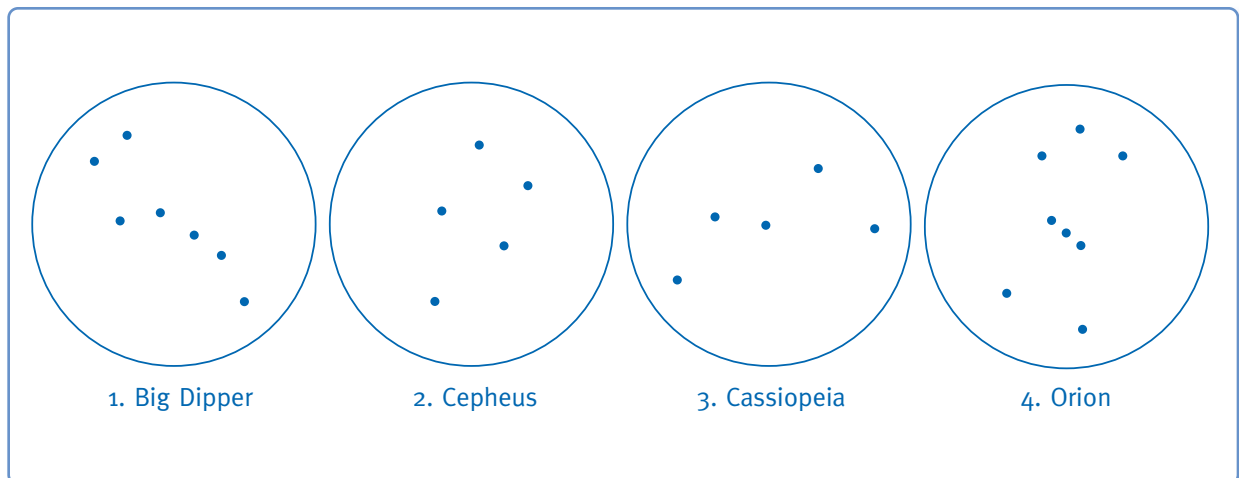
With your demonstration tube, go to one of the light sources and show students how you hold the tube with the patterned end toward the light while you look through the tube at the bright constellation pattern.

Tell students to construct their constellation viewers, look through them toward the light sources, and then complete their activity sheets.

Tell teams they will swap constellation tubes with other teams until all students have identified the four constellation patterns and recorded the names on their activity sheets (see Figure 30-2).

## Additional Information

*Leave the transparency of the night sky in winter projected so that students can identify the patterns they see in their tubes.*



▲ **Figure 30-2.** Reverse constellation patterns.

## Guiding the Activity

### Additional Information

- 7 After teams have completed their activity sheets, call their attention to the board.

Write the numbers and names of the constellations on the board: 1. *Big Dipper*; 2. *Cepheus*; 3. *Cassiopeia*; 4. *Orion*.

Have teams check their answers on their activity sheets with the key on the board to confirm that they named the constellations correctly.

- 8 Tell students that next they will write their own story about any constellation that they choose. Project one or more of the transparencies for students to observe various constellations again.

*Also refer to Figure 30-2.*

*As an example, tell students that in Greek mythology Orion was known as The Hunter. He was the son of Poseidon. He is seen in the stars holding a shield in his left hand and a club in his right. His right shoulder is represented by one of the largest stars known—Betelgeuse. Rigel and Salph represent his two feet. Three bright stars make up his belt. You could also tell the story about how the constellation Cassiopeia got its name. In Greek mythology, Cassiopeia was a queen of Ethiopia. She was to be killed by a monster sent by Poseidon, but she was saved by Perseus. Her constellation represents the form of a woman seated in a chair, holding up her arms.*

Distribute a copy of **Activity Sheet 30, Part B**, to each student.

- 9 When all the stories are written, ask volunteers to share their stories with the class. Call attention to parts of stories that involve Earth and other objects in our Solar System as well as other stars.

## REINFORCEMENT

Have each student draw his or her constellation on chart paper for display in the classroom. If appropriate, students may use their constellation viewers to teach other students in the school about constellations.

## SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

## CLEANUP

Light sources, push pins, bottles of glue, and cardboard squares should be returned to the kit. Transparencies and the Constellation Patterns should be placed in the kit. Have students discard paper scraps and used copies of constellation patterns. Team members may want to take turns taking their constellation viewers home.

## SCIENCE AT HOME

Encourage students to teach someone at home about the constellations. Tell them to use a flashlight to point out stars and constellations in the night sky. The shaft of light from a flashlight works remarkably well to point out specific stars and shapes of constellations at night. Particles of dust and moisture in the air reflect the light along the path of the beam, making it quite visible.

## Connections

### Science Challenge

Have pairs of students do the following activity during the viewing session. Cut a piece of string 30 cm (1 ft) longer than your height and tie a nail to one end so the nail points downward. Lay a large sheet of poster paper on the ground. Loop the free end of the string around your index finger, then stand at one edge of the paper and point to a star in the Big Dipper. Your partner should mark the spot on the paper directly below the nail point. Continue pointing to different stars in the Big Dipper while your partner marks the nail's position for each one. When all stars are plotted, a large drawing of the Big Dipper will be formed on the paper. Find and mark the position of the North Star by drawing a straight line that connects the two stars in the right edge of the dipper's bowl and projects beyond it to the North Star.

### Science Extension

Before the viewing session in this connection, have each student make a device called a "star frame" to help focus on one particular group of stars at a time. Make a star frame yourself as a demonstration: Bend a wire coat hanger into a square by pulling on the middle of the long bottom wire. Bend the hook and wrap it with tape to make a handle. Show students how to hold up the star frame at arm's length to view the sky in sections.

Arrange at least one evening viewing session (chaperoned by parents or other volunteers) for the class to observe the night sky. For the best viewing, choose a moonless night. Help students locate several constellations and the planets that can be seen with the naked eye (Mercury, Venus, Mars, Jupiter, and Saturn). If you are not adept at locating constellations and planets yourself, consult children's astronomy guides such as those in the References and Resources section before and during the viewing session, and try to find at

least one chaperone who can also help students. If possible, obtain several pairs of binoculars or a telescope so students can observe the planets more closely.

### Science and the Arts

Ask students to find pictures of constellations in astronomy guides and other books. Have each student choose a favorite constellation and mark its stars with white paint on a large sheet of dark blue or black construction paper, then use colored paints, chalk, or other materials of his or her choice to draw the figure represented in the constellation.

### Science and Language Arts

Encourage students to read myths about the Greek and Roman gods whose names were given to planets and constellations. You may want to do this as a cooperative learning activity, with a different god assigned to each team and students preparing a report that includes a short tale about the god's exploits. Give each team an opportunity to present its report to the rest of the class.

### Science and Social Studies

Encourage students to find out about the sky myths developed by other cultures besides the Greeks and Romans. For example, the Tsimshians, Native Americans of the Pacific Northwest, believed that the Sun—whom they called "The One Who Walks Over the Sky"—wears a flaming mask that lights Earth and creates stars with sparks blowing out of his mouth when he sleeps.