

# Investigation Three – Constellations: Pictures in the Sky

<b>Standard 04:</b> Students will understand the scale of size, distance between objects, movement, and apparent motion (due to Earth’s rotation) of objects in the universe and how cultures have understood, related to and used these objects in the night sky.
<b>Objective 2:</b> Describe the appearance and apparent motion of groups of stars in the night sky relative to Earth and how various cultures have understood and used them.
<b>Intended Learning Outcomes</b> 3 – Understand science concepts and principles 4 – Communicate effectively using science language and reasoning

**Standard  
IV**

Objective  
2

## Teacher Background

Although stars in our night sky seem to be the same distance away from Earth, they are not. Most stars are trillions of miles away from Earth, and from each other. It’s just that stars are all so far away that our eyes can’t tell how much farther some are than others. Stars that form constellations are not usually close to each other.

## Pre-Assessment/Invitation to learn

Ask students if they think stars in a constellation are close together or far apart. Have them base their opinions on observations they have made of the night sky.

### Materials

- Three flashlights of the same brightness
- A dark, large area (auditorium) or lunch room.

1. Choose three students to represent three stars in the handle of the Big Dipper. Give each student a flashlight.
2. Have the rest of the class stand at one end of a long dark room.
3. Mark a line on the floor and have one child stand on it. He/she is Mizar (MY-zar) and is 78 light years away from Earth.
4. Have another student stand two feet to the left of Mizar, and two feet behind the line. He/she is Alioth (AL-ee-oth) and is 81 light years away from Earth.
5. Have the remaining child stand five feet to the right of Mizar, and six feet behind the line. He/she is Alkaid (al-KAYED) and is 100 light years away from Earth.
6. Have Mizar, Alioth, and Alkaid turn on their flashlights and point them toward the rest of the group. Turn off lights in the room.
7. Ask the students what they notice about the stars. Do the stars appear to be the same distance away? (The stars should appear to be close to each other). Why do the students think this happens?
8. Explain to the students that because stars are so far away from Earth, they appear to line up in the sky and form constellations. Mention that the stars in the Big dipper are closer to each other than most stars are in other constellations.

## Instructional Procedures

### Materials

- Picture of Orion for each student
- Picture of Orion (stars labeled with light years) for each student
- A piece of cardboard for each student
- Seven beads for each student
- Fishing line
- Rulers

1. Hand out both pictures of the Orion constellation.
2. Have students glue the first picture (the one that isn't labeled) to a piece of cardboard and poke holes in the seven biggest stars in the constellation.
3. Tell them to look at the second picture and pay attention to how many light years away each of the stars are from Earth.
4. Hand out fishing line and seven beads to each student.
5. Explain to students that they are going to use fishing line and beads to represent the distance from Earth for each star in the Orion constellation. Explain to students that the star with the least amount of light years will have the longest string because it is closest to Earth. Stars that are the most light years away from Earth will have the shortest string.
6. Tell students that instead of measuring with light years, they are going to be using centimeters. Have students figure out what length of fishing line would represent each star.
7. Have students place the appropriate length of string in the holes they made for each star. Tape the string to the back of the cardboard.
8. Have them tie a bead on the end of each string. The bead represents the sun.
9. Hang the finished products on the ceiling so students can see that stars in a constellation are not all the same distance from Earth.

## Curriculum Extensions

Science –

- Have students look up other constellations to see how far the stars are apart from each other. Put them in groups of 4 or 5. Have them visually show the distance between each star by making their own scale demonstrating it. (ILOs 2,3,4)

## Assessment Suggestions

Put students in groups of three. Have each member discuss his/her observations of the activities. Walk around the room and clear up any misconceptions the students may have.

Reference to Assessment Section:

	Multiple Choice	Constructive Response	Performance Test
Unit Test	9, 10, 11, 12, 13	4, 5, 6, 7	Constellation Calendar

## Resources

*Books –*

- Dickinson, Terrence. *Exploring the Night Sky*. 1998. Good description of light time and relating it to objects in space, star distances, and constellations. Good pictures and photos, text covers, about half the pages. 72 pages.

- National Audubon Society. *First field Guide: Night Sky*. 1999. Nice overview of all astronomy topics. About half of the book focuses on finding objects in the night sky. 160 pages, pocket size paperback. \$8.95
- Hawkes, Nigel. *Mysteries of the Universe*. 1995.
- Lambert, David. *Stars and Planets*. 1994
- Miles, Lisa and Alastair Smith. *The Usborne Complete Book of Astronomy & Space*. 1998.
- Muirden, James. *Visual Factfinder: Stars and Planets*. 1993.
- Sasaki, Chris. *The Constellations*. 2002
- Crosswell, Ken. *See the Stars*. 2000
- Gram, Ken and Suzanne Malay. *Our Galaxy and Universe*. 2002
- Davis, Kenneth C. *Don't Know Much About Space*. 2001
- Branley, Franklin Mansfield. *Book of the Milky Way*.



