INFLATABLE PLANETARIUM

http://www.jpl.nasa.gov/education/planetarium

Introduction

From the very early stages of life, children begin to explore their natural surroundings and through this, engage in basic scientific thinking. The acquisition of language allows them to ask questions about what they observe and experience.

Science investigations are an excellent opportunity to engage students in meaningful reading and writing activities.

Research has shown marked improvement on school district and state writing proficiency exams among students involved in inquiry- and activity-based science with significant writing components.

This lesson provides an engaging avenue to practice writing through science.

Lesson Goal

Students will use their imagination to create a star pattern and an accompanying story to demonstrate an understanding of how ancient people related to constellations and asterisms.

Problem

How can constellations and star patterns be used to tell and share stories?

Learning Objectives

- Students will design a star pattern
- Students will write a story about their star pattern

Safety

The supervisor should have a flashlight and a pair of scissors in case emergency exit is required. Interior carpeting improves footing.

Although the interior volume of the planetarium is large and it does not get very dark inside, teachers should be aware of signs of claustrophobia or unease among students.

At no time should an open flame be allowed anywhere in or near the outside of the dome

Grade level: 2-8

Connections to Curriculum: Science and Language Arts

Science process skills: observing, communicating

Teacher preparation time: 60 minutes

Lesson duration: 45 minutes

Prerequisite: none

National Education Standards

English Language Arts – NCTE Standard 3 (apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts), Standard 4 (use of spoken, written, and visual language), Standard 5 (vary strategies and elements for different audiences); Science – NSES Standard 5: Earth and Space Science (objects in the sky)

Materials Required

Inflatable Planetarium – Creating Stories in the Sky (video) – available online: www.jpl.nasa.gov/education/planetarium

"4 mil" black plastic sheet (20ft x 50ft)

1 large roll of utility tape

1 large black plastic trash bag (30 gal. or larger)

1 box fan

crayons or washable markers

ballpoint pens or sharpened pencils

scissors

flashlight

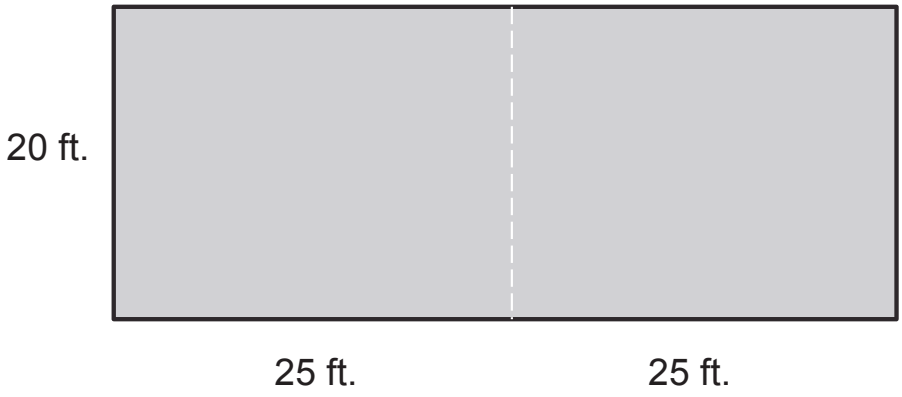
student activity sheet

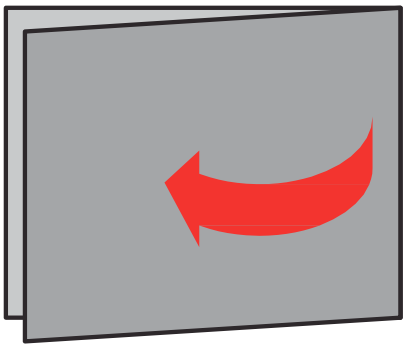
Pre-lesson Instructions

Construction of the planetarium

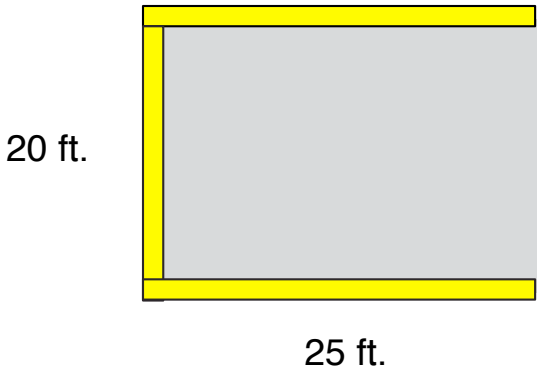
- Open the roll of black plastic, unroll the plastic and unfold until the full size is lying on the ground. This will take a big space such as a gymnasium or a clean space outside. The ground needs to be smooth and level underneath the planetarium.

- Take the corners and fold the plastic in half along the width of the sheet.



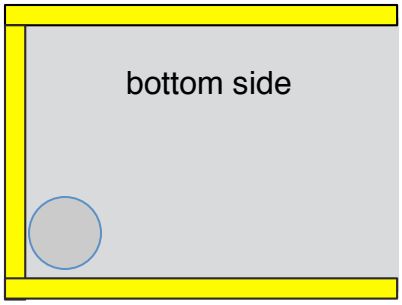


- Tape the “open sides” with utility tape being sure to fold the two plastic sheets over each other in a French fold so that there will be no “light gaps.”

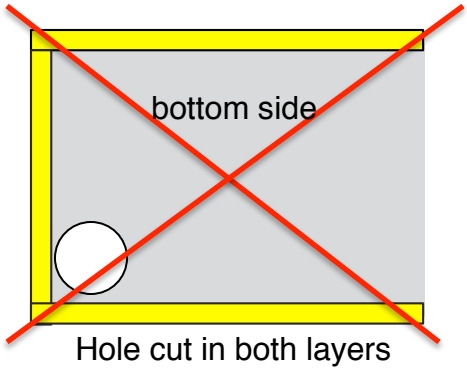


- Cut the bottom out of the trash bag, creating a tube.

- Using scissors, opposite from the end that will have the entrance/exit, cut a hole that is the size of the open end of the trash bag on the underside of the sheet. Be sure to only cut through one layer of the sheet—not both.

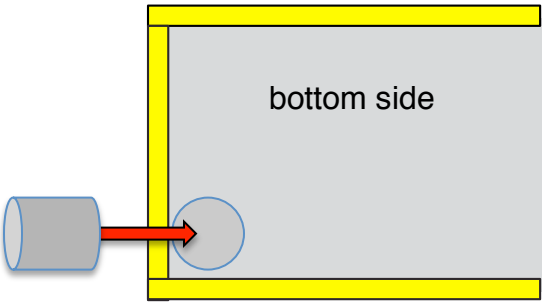


Hole cut in one layer

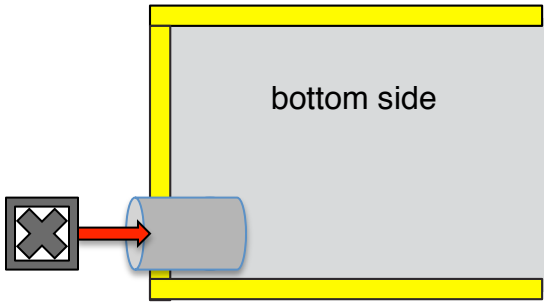


Hole cut in both layers

- Line up the plastic bag tube with the hole in the planetarium and use utility tape to attach it to the plastic of the planetarium.

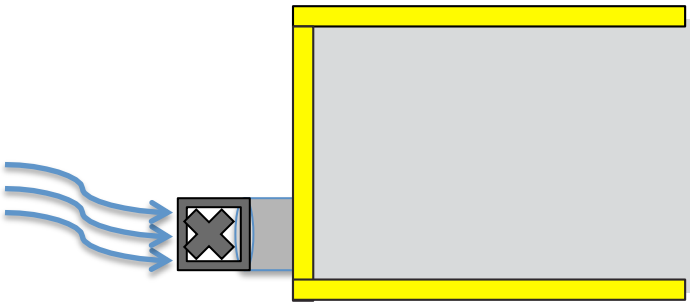


- In the same way, insert the unplugged fan in the other end of the trash bag and tape them together so that the air from the fan will blow through the trash bag tube into the planetarium.



- Now plug in the fan and the planetarium will inflate.

- Access to the planetarium may be accomplished by a simple inverted-T slit made by the teacher with scissors. An entrance and exit opening separated by a few feet is advised. In an emergency, the teacher can always easily cut open a side with scissors for exit.



- Carpet on the bottom of the planetarium will prevent slipping on the plastic.

Background

There are about 3,000 stars visible to the naked eye on a clear night in dark skies. Throughout history, people have seen patterns in the stars. They imagined that the patterns looked like familiar objects and created stories to go along with them. These patterns are called asterisms. Some of these asterisms may be familiar to you, such as the Big Dipper.

The International Astronomical Union has identified 88 regions of the sky for naming star patterns called constellations. Other patterns, such as the Big Dipper, are called asterisms. Most constellation names are based on Greco-Roman mythology, though almost all cultures in the world have their own star patterns and stories. Constellations and asterisms can be used for finding directions in the sky as well. For more information about asterisms and constellations, visit:
http://starchild.gsfc.nasa.gov/docs/StarChild/questions/question9.html and
http://starchild.gsfc.nasa.gov/docs/StarChild/questions/88constellations.html

Management
Several facilitators are necessary for this activity—some to work with students as they draw, some to assist poking the star patterns into the planetarium walls, and some to manage the activity in the planetarium. Involve teachers, older students, and parent-volunteers. This activity does not have to include the planetarium; it can consist only of creating the star pattern and writing a short story to accompany it.

Job Descriptions When Running the Planetarium (3 persons total at all times)

- One supervisor inside the planetarium to monitor behavior and the total number of people inside, help with hole-punching, and use the flashlight to guide walking and viewing. In case of electrical failure, this person will guide participants out of the planetarium. The dome will remain inflated for several minutes allowing for orderly exit through the normal doors, but the plastic can easily be cut with scissors for an emergency exit. Large cuts will deflate the dome more rapidly.
- One exterior manager to help people in and out of the planetarium from the outside.
- One materials manager to supervise the fan, electricity and general condition of the planetarium (generally from the outside).

Instructional Procedure
Assemble students and determine what they know about constellations. Discuss what a constellation is and ask if they can name some constellations or asterisms (constellations are specific groupings of stars designated and named by the International Astronomical Union, IAU; all other groups of stars the sky are known as asterisms). Ask students if they have ever created their own star patterns, or have thought about creating their own.

Present students with the student activity sheet and crayons or markers and explain that they will be creating their own star pattern and writing a story or explanation to go along with it.

By asking about their lives (where they live, who are the important people in their lives, what are important activities or hobbies they have), suggestions of possible patterns they could create can be provided. As they draw their star pattern, assistance may need to be given as to where to place stars so they successfully form a pattern. It may be useful to limit students to using six or seven stars. As they're drawing, help them articulate why the object they've chosen is meaningful.

On the lines provided on the activity sheet, have students write a short, descriptive story about their star pattern, or explain its significance and why they chose it. They can use the back of the sheet if necessary.

The planetarium supervisor will lead each group of approximately 15 students into the planetarium where they will poke holes representing each new star pattern into the plastic walls with a ballpoint pen or sharp pencil. Place the activity sheet on the plastic wall of the planetarium. Poke a hole through each star on the paper and through the plastic. Each hole is one star in their star pattern. Assistance may need to be given with poking holes in the plastic.

Assemble the class or small group inside the planetarium when all the star patterns are complete. Have each student take a turn telling his or her story. Activity sheets may be collected for display, and then taken home.

Conclusion

When all stories have been read, a discussion about themes of the stories can provide additional information. Past experience has shown that human nature tends to cluster stories around three themes:

- Stories about persons who are friends, famous, familiar or infamous
- Historical events in students' lives or community
- Moral or societal lessons that need to be shared and remembered (e.g. kind behavior toward others is often rewarded with returned kindness)

Assessment

- Assess student learning through questioning
    - Ask students to share what a constellation or asterism is.
    - Ask students to explain how constellations and asterisms were once used.
    - Ask students to compare and contrast their story with another story in the class.
    - Ask students to share one thing they learned about another member of the class.

Activity alignment to National Education Standards

NCTE standards for the English Language Arts

Standard 3

- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).

Standard 4

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

Standard 5

- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

NSES standards for Science

Standard 5 – Earth and Space Science Standards

- Objects in the sky

Stories in the Sky

There are about 3,000 stars that you can see overhead with your own eyes on a clear night in dark skies. People have always seen patterns of stars and imagined that they looked like familiar objects. Some of these patterns are familiar to you, such as the “Big Dipper.”

But anyone can find or create their own pattern and give it a name and story!

Use the space below to make a star pattern, connect the stars with lines, and make a drawing with colored markers or crayons that shows what you imagine the star pattern looks like.

Then write a short story to describe the meaning for this new star pattern. When you have finished, someone will help you enter our “planetarium” and you can put your star pattern in the top of our planetarium so the light can shine through, making it look like a night sky full of stars.

My Star pattern

The name of my star pattern is _____

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