Earth is Round?

Summary

After recreating Aristotle's discovery that the Earth is round, students will create a moon box to model the phases of our moon.

Materials

- Globe pattern
  Tennis balls
  Small styrofoam ball
  Small desk lamp
  18" x 9" construction paper
  Shoebox
  Scissors
  Flashlight
  Spool of thread
  Glue
  The Moon

Additional Resources

Books

- *Don't Know Much About Space*
  , by Kenneth C. Davis; ISBN 0-439-43850-0
- *Eyewitness Books: Astronomy*
  , by Kristen Lippincott; ISBN 0-75660656-X
- *The Moon*
  by Seymour Simon; ISBN 0-439-79644-X
- *The Best Book Of The Moon*
  by Ian Graham; ISBN 0-7534-5174-3
- *Kids Discover: Moon*
  (Kids Discover, 149 Fifth Avenue, New York, NY 10010, kidsdiscoverteachers.com): Moon
- *365 Science Projects And Activities*
  by Phyllis J. Perry and Peter Rillero, Ph.D.; ISBN 0-78531592-6

Videos

- *Bill Nye the Science Guy: The Moon*
  by Disney Educational Productions (800)295-5010 (website below)

Background for Teachers

Students probably know that Earth is spherical, but you can have a discussion about how Aristotle came to this conclusion so long ago and what it might have been like if Earth were flat.
Some people think that Christopher Columbus' voyage in 1492 proved that Earth was round. However, Aristotle's studies proved this nearly 2000 years before Columbus. Aristotle had two arguments: first, that during a total lunar eclipse Earth casts a curved shadow on the moon. He concluded that Earth would have to be spherical. Second, the fact that a person who traveled north or south would be able to see new stars that hadn't been visible before. If Earth were flat people would all be able to see the same stars. During a lunar eclipse Earth comes between the Sun and the moon and casts a shadow on the moon.

Intended Learning Outcomes

1. Understand science concepts and principles.

Instructional Procedures

Invitation to Learn

Have students draw any geometric shape on their paper. After everyone has drawn their shape tell the students to add seven large land masses on their shape. Tell each student to color the land masses brown and the remaining areas blue to represent the ocean. Tell students to imagine what it would be like if Earth were the shape of their drawing. Have students list on their paper different problems that might come about because of their shape. Allow students to present their geometric "Earths" and talk about the possible problems of the different shapes.

Instructional Procedures

Talk about how Aristotle discovered 2000 years before Columbus that the Earth is round. Talk about misconceptions and different theories that existed anciently. Take an imaginary trip around a "flat world". Play *What If* posing questions on how life would be different.

- Present a flat model of the Earth and change it to a spherical model by cutting it and wrapping it around the tennis ball.
- Journal Activity:
- Students pose the question: How do we know that Earth is round? Have them record any previous knowledge or experience and information from your previous discussion.
- Hypothesis: Students record their own hypothesis of how we know that Earth is round in their journal.
- Experiment: Recreate Aristotle's discovery. Use the students' models of Earth, a lamp to represent the sun, and a small foam ball to represent the moon to model the eclipse that Aristotle saw which proved that Earth is in fact round.
- Place the lamp in the middle of the room and darken the rest of the room. One student holds the foam ball in the light of the lamp. Another student uses his or her model of Earth to cast a shadow on the moon.
- Students draw what they see in their journals and make a conclusion. Discuss with the class how Aristotle discovered that Earth was round.

Captain's Log

Now that students are familiar with the shape of Earth, let's talk about the moon.

- Students make a shape book of the moon by cutting out several circles about six inches in diameter.
- Read aloud and discuss *The Moon* by Seymour Simon. Students pretend they are the captain on a trip to the moon and will record everything they see (hear in the story) for the people back on Earth. As you read students will write a sentence in their moon book and draw a picture for each page of the story, describing the appearance and characteristics of the surface of the moon.

Moon Box

- Journal- Write the question: Why does the moon appear to change shape? Gather information to determine students' previous knowledge. Have students record their hypothesis in their journal.
- Students will make a model of the phases of our moon. Cut a hole in one end of the shoebox big enough to shine the flashlight through. Cut eight small holes (big enough to see through) all around the sides of the box--one on each short end and three on the longer sides. Glue the spool of thread inside the box and glue the tennis ball on top of the spool. Shine the flashlight through the big hole and look in each hole, observing the image of the moon and how it changes. Number the holes and students will sketch what they see in corresponding boxes on the recording sheet. Discuss with students the names of each of the phases of our moon and

label them accordingly on the recording sheet.
Discuss with students that instead of moving around the moon like we did in the experiment, the moon actually revolves around Earth, but the sun remains stationary. Lead students to the conclusion that the moon changes shape because of the location of Earth in relation to its moon. Have students record their conclusion in their journal.

Extensions

Curriculum Extensions/Adaptations/ Integration
Literature: Read and discuss *Kids Discover: Moon* magazine. Use posters from the EDUGraphics (website below) that show different images of Earth if it were a different shape to further the discussion in the invitation to learn.
Video: *Bill Nye the Science Guy: The Moon*
Family Connections
Students share their moonbox with someone at home and challenge them with the scientific questions discussed in class.

Assessment Plan

Observe and question students.
Journal activities
Shape book

Bibliography

Research Basis
Furner, Joseph M., Yahya, Noorchaya, and Duffy, Mary Lou. (2005). 20 Ways to teach mathematics: Strategies to reach all students. *Intervention in School and Clinic*, Volume 41, No. 1 (September 2005), Pages 15-23.
This article gives 20 ways to teach mathematics, but applies very much to teaching science as well. It talks about using concrete objects to explain abstract concepts and allow a lot of hands-on activities. It also talks about heterogeneous grouping for cooperative learning. Other tips in the article include using children's literature, Internet field trips, word bank charts, and auditory, visual, and kinesthetic approaches.
Jarrett, Denise. (1999). The inclusive classroom: Mathematics and science instruction for students with learning disabilities. *It's just good teaching*.
This article discusses the benefit of using "Inquiry-Based Science" or in other words posing a question to students and providing activities and/or experiments to allow students to discover the answers to scientific questions themselves rather than just being told. The article talks about using varied levels of inquiry depending on the age and ability of the learners. The article poses the argument that inquiry based learning is a good way to help students with disabilities to be involved in the learning process in the regular classroom.

Authors

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