**October 16, 2010: Earth**

1. Learning Objectives: Students will understand that

* the Earth is a sphere.
* the Earth rotates on an axis.

1. Standards

* 3.1.2 Participate in different types of guided scientific investigations, such as observing objects and events and collecting specimens for analysis.
* 3.1.3 Keep and report records of investigations and observations\* using tools, such as journals, charts, graphs, and computers.
* 3.1.4 Discuss the results of investigations and consider the explanations of others.
* 3.1.5 Demonstrate the ability to work cooperatively while respecting the ideas of others and communicating one’s own conclusions about findings.
* 3.2.3 Keep a notebook that describes observations and is understandable weeks or months later.
* 3.6.3 Explain how a model of something is different from the real thing but can be used to learn something about the real thing.

1. Materials

* Globe pattern
* Pictures of a spherical Earth (24) paste in journal
* Map of Earth – flat (world map)
* Crayons and/or markers
* Small desk lamp (6)
* Ball to represent the moon
* Flashlight to represent the sun
* Play dough or clay
* Toothpicks
* Globe
* Fender washers (12)
* 2 inch pencils sharpened on one end (12)
* Ping pong balls (12)
* Outline drawings of Earth
* Scotch tape
* Scissors (12)
* Journal – created for students
* Flat Earth? Round Earth? book
* Paper for name tags

1. 9:30 – 9:55 **Introductions:**
   * Have students create a name tag.
   * While the students are arriving, have each student draw a picture of something scientific, but do not include any words on the front of science journal. Once all the students have arrived and each drawn something, each student will present their picture and the audience will guess what the student drew.
     + The student will then state their name and why they chose to draw what they did.
2. Talk about attention getter ☺
3. Description of Lesson:
   * (9:55 – 10:40) Earth is Round:
     + Engage/Explore:
       1. Give each student a half sheet of paper (use front page of journal).
       2. Students will draw a geometric shape on their paper.
       3. Tell the students to add 7 large land masses on their shape.
       4. Color the land masses brown and the remaining areas blue to represent the ocean.
       5. Imagine what it would be like if Earth were the shape of your drawing?
       6. List on your paper different problems that might come about because of your shape.
       7. Have students present their geometric “Earths” in their small groups and talk about possible problems of the different shapes.
       8. Have students create what they think the Earth looks like with play dough or clay.
       9. Question: What shape is the Earth? How do you know? Is there anything in this room that represents what you think Earth looks like?
       10. Questions: If you were to walk for many days in a straight line, where would you end up? Would you ever reach the end or edge of the Earth?
       11. Here is a picture of a flat map of Earth (show students tennis ball globe) do you usually see a picture of the Earth like this? Why or why not?
       12. Why are maps of the Earth flat?
       13. What shape do you think this flat model of Earth can make? (sphere) – Show students my model

* Explain:

1. Show map of flat Earth… is this what Earth looks like? Show globe… is this what Earth looks like?

* Discuss with students that Aristotle discovered 2000 years before Columbus that the Earth is round.
* Aristotle knew the Earth was indeed round because during a lunar eclipse the Earth casts a curved shadow on the moon. (Demonstrate this for the students).
* Extend:
  1. What other objects in space are also spheres?
* <http://www.rense.com/general72/size.htm>
* Google 3D moon under images
* Evaluate:
  1. Look at students journals.

**Break – 10:40 – 11:00a.m. – Read Flat Earth? Round Earth? by Theresa Martin pg. 9-13**

* (11:00 – 12:00p.m.) – The Earth is Flat
  + Explore:
    1. Hand each student a washer and ask them to identify ways that the washer and Earth are the same.
    2. Color and cut out the outline drawings of Earth and glue them to one side of the washer.
    3. Using a desk lamp as the sun, invite the students to notice different possibilities of shapes (shadows) made by the washer and record them in their journal.
    4. Now pass out a ping pong ball and ask them to identify and draw as many different shapes as can be made by the ball.
    5. Are there ways the washer makes a circular shadow?
    6. Is it possible to make the washer continuously appear to make a circular shadow?
    7. Insert the pencil into the hold in the washer far enough that friction will solidly hold it in place.
    8. Write the word “axis” on a small piece of tape and attach it to the pencil nearer the top of the pencil.
    9. Write the word “rotation” near the outer rim of the washer.
    10. Practice spinning the “Earth top”. If it wobbles try to figure out why. What makes it spin longer? Does it help if the washer forms a right angle to the pencil all the way around?
    11. Discuss the axis as it relates to the map of Earth on the washer with others at your table. Does Earth really have a pencil stuck through it? Does Earth spin like a washer?
    12. Spin the ping-pong ball. Is there a place it seems to spin around? How is the ping-pong ball like Earth? How is the pencil in the washer like Earth?
* Explain:
  1. We will discuss the answers to the questions above that the students should have answered while they were experimenting.
* Extend/Evaluate:
  1. Does the information we learned relate to a globe? A more realistic representation of the Earth.
     + Is there some part of the globe where the spinning part is the smallest?
     + Why do you think this happens? (It is closest to the center of the spin, rotation)
     + What is the imaginary thing that comes out of the Earth called? (Axis)
     + Have students stand up and model rotation with their bodies.
     + Write in words in journal (axis, rotation, sphere)
     + Read pages 41-51 if I have time.
* Let the students know that we would like them to view the moon every day. Sometimes you might see it at night and some times you might see it during the day. Keep a journal with a picture of the moon along with the day and time you saw it.



