

EDUC Q405
Saturday Science
Spring 2011
Week 4

Learning Objectives:

- Students will be able to use their observations to make inferences on what causes the seasons through looking at pictures of the earth and where the sunlight is reaching the earth and be able to show what they infer by adjusting their planets to match the picture.
- Students will be able to understand that the reasons that there are seasons on Earth are because of the tilt of earth's axis and they will be able to show this through answering questions.

Indiana Academic Science Standards:

Process Standards (NOS):

- Conduct investigations that may happen over time as a class, in small groups, or independently.
- Generate questions and make observations about natural processes.
- Make predictions based on observations.
- Discuss observations with peers and be able to support your conclusion with evidence.

Core Standard:

K= Observe, record, and recognize patterns and generate questions about night and day and the seasons

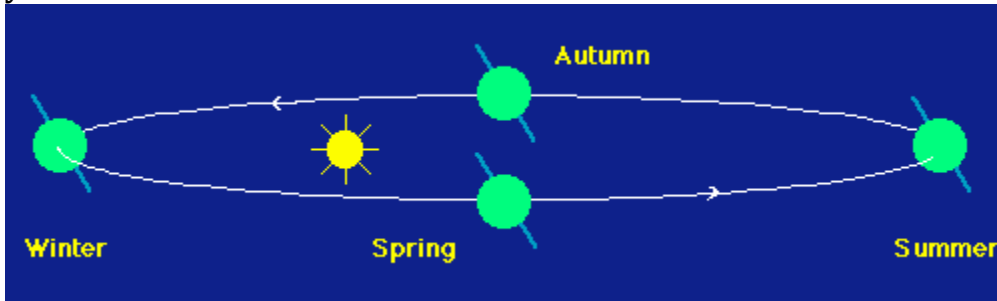
Content Standards:

- K.2.3 Describe in words and pictures the changes in weather from month to month and over the seasons.
- 2.1.5 Describe the position of an object relative to a point of reference (background or another object).

Teacher Content Knowledge:

- Teacher needs to know that what causes the seasons is the tilt of the Earth's rotational axis away or toward the sun as it travels around the sun and that the sun does not move relative to the earth, but the Earth does.
- Teacher needs to know that night and day are caused by the rotation of the earth and that while it is day on one side of the earth on the opposite side of the earth it is night. The Earth rotates in counter clockwise direction. Teacher also needs to know that the amount of time that it is light outside is affected by the tilt of the earth and the time of year. In June, the Northern hemisphere, where the US is, is oriented more toward the sun and therefore the part of the Earth gets warm up because there is more heat and sunlight. The Sun rises higher in the sky and is above the horizon longer, and the day is longer. On the other hand, the winter, the Earth tilts away from the sun, which means that the Northern hemisphere is oriented far away from the sun. This part of the Earth gets less heat and sunlight. The sun is above the horizon in a shorter period and that why the length of the day is short.

- Teacher needs to know that the Northern hemisphere and Southern Hemisphere do not have the same season at the same time because the tilt of the earth affects the amount of sunlight that hits the different points on the earth at different strengths. The diagram below shows the season of the **northern hemisphere throughout a year.**



Retrieved from <http://csep10.phys.utk.edu/astr161/lect/time/seasons.html>

Materials:

- 24 folders (2 pocket folders with 3 prongs)
- Play-doh (same as last week)
- Paper
- Pencils
- Markers
- Crayons (12 boxes)
- 2 Light socket bases with bulbs (no more than 60 watt) (Meredith set them up in 3015)
- Globe
- Mini flash lights for each student (24)
- Chart paper
- Sticks (already have these)
- 30 copies of the handout attached (page 5 of lesson plan)

Description:

- We will begin the lesson by giving the students the day/night review handout (page 5 of lesson plan) to do while waiting for everyone to arrive so that the students can review what they learned about day and night the previous week. This will allow us to assess what the students remember from the week before so that we know how much we will need to review before going on to the next topic which builds on last weeks topic.
- Introduce this week's material by revisiting last week's activity to start with.
 - [Kids will make a planet out of their Playdoh again using a flashlight as the sun. They will observe what part of Earth is day/night as the Earth rotates.]
 - Questions that we may ask (embedded formative assessment):
 - In what direction the Earth is rotating?

- (Face one side of their Earth model to the sun) Can you show/ point out to me which part of the Earth is day time?
- (put a pin on their earth model) Supposed this is the US and we are in the US, can you show me how the Earth faces the sun when you have night time?
- And what about when we have day time?
- And about those people who live here (point to the south pole), what time do they have?
- We will show the picture of the Earth that highlights that the axis is tilted. We will then return to the topic from week one of observations and inferences and ask students to make observations about this picture. We will show them several of the pictures from the website and then have them make the observations and inferences on one of the pictures that shows the tilt of the earth. To engage them to making observation, we will ask, "What do you notice from this picture?" (Prob: does the sun light shine the half of the Earth on the left/ right? Is it dark all this side of the Earth?) After students make observations about the picture, we will have the students make inferences on what they think has caused the picture to look the way that it does. We will probe students' thinking about whether the Earth is straight up and down or if something else is happening to cause the earth to look the way it does.
 - [\[http://www.learner.org/jnorth/tm/mclass/jr/DayYear/TimeYear9.html\]](http://www.learner.org/jnorth/tm/mclass/jr/DayYear/TimeYear9.html)
 - Ask "What can you do with the Planet you made to make it look like this? How can you change or position it to match the picture you see?"
 - *We will be walking around assessing that every student can successfully have his or her planet tilted (Popsicle sticks stuck through the middle of them make this easy for them to do). Also, we will ask, "What do you think make the Earth look like that?" (Answer: the Earth is not straight up and down but it tilts.)
 - We will assess the students on their knowledge of night and day on Earth by asking:
 - What happens to the side of the Earth that faces the sun? (day time)
 - What about the opposite side of the Earth? (night time)
 - Suppose the US is facing the sun right now (use a pin to mark US position on the globe) and I have a friend who is from Thailand which is on the opposite side of the earth (use a pin to make Thailand's position). Now she is in Thailand, what is happening in Thailand right now? (It's night time; 12 hours ahead)
 - What about my other friend in England (mark the position)? What time do they have now? (afternoon; 6 hours ahead)

- After students have had a chance to explore what causes the earth to look like it does in the picture we will discuss that we have been focusing on day and night, but now want to learn why the four seasons occur.
- Show video just up to 44 seconds into it (after showing southern and northern hemisphere).
 - [\[http://www.youtube.com/watch?v=DuiQvPLWziQ\]](http://www.youtube.com/watch?v=DuiQvPLWziQ)
- As a class, we will look at a globe and label the northern and southern hemisphere.
 - Then we will give the students time to label the northern and southern hemisphere on his or her Playdoh planet.
 - *We will be walking around assessing that each child has successfully labeled the two parts.
- We will then show rest of the same video (44 seconds to the end) to show how seasons are caused by the Earth's tilt.
 - [\[http://www.youtube.com/watch?v=DuiQvPLWziQ\]](http://www.youtube.com/watch?v=DuiQvPLWziQ)
- Bathroom/Snack
- We will then work with the students to create the Earth-Sun System to model the seasons.
 - A lamp will be placed on the floor with 4 x made with masking tape on four sides of the lamp on the floor.
 - Have students find Bloomington, IN on the globe and make it with a piece of paper.
 - Discuss the terms of rotation and revolution with the students and have the students demonstrate these concepts with their bodies in order to get a better understanding.
 - Place the globe so that the light is hitting the location and the rotate the globe one rotation and the students "What do you think each rotation represents?"
 - Next explain that the x on the floor represent the different seasons. Remind students that the earth's axis is not straight up and down but that it is tilted and that the North Pole is always facing the North Star.
 - Have the students walk around the lamp with the globe. The student should be spinning the globe in order to represent the days that are passing. Ask the students, "What do you think one complete revolution represents?"
 - Have the students hold the globe at each x and rotate the earth two times keeping the North Pole facing the North Star. Have the students keep track of their location on the globe and the amount of sun that the location receives from season to season.
 - Ask the students, "If I was in Bloomington and building a snowman, what might a girl in Australia be doing?" Then ask them to articulate their understanding by asking, "Can you show me how the Earth faces to the sun during that time with

your earth model the lamp?" Continue asking similar questions using the different seasons.

- The more challenging question:
 - So, during winter in the US, what is season in India? (We will point to that country. It is the country at the equator, which the weather never dramatically changes from season to season.)
 - And, what about during spring in the US, what is season in India? What about summer here?
- If extra time allows:
 - Allow students to explore website:
[\[http://www.learner.org/jnorth/tm/mclass/season_simulator.html\]](http://www.learner.org/jnorth/tm/mclass/season_simulator.html)

Assessment:

Students will be assessed mostly through observation of their abilities and staying on task. They will also be assessed by their worksheet in order to understand what they remember from week 3 so that we know exactly what we need to review before we get started. Each student will show that they understand that the earth is tilted by their experiment with their own planet. Students will be assessed on their knowledge of observation and inference through the discussion on the picture of the earth.

Handouts:

The students will be given the handout to review night and day to be put in their science notebook. (page 4 of lesson plan)

References:

http://www.weatherquestions.com/What_causes_the_seasons.htm

<http://csep10.phys.utk.edu/astr161/lect/time/seasons.html>

<http://www.christiananswers.net/kids/edn-seasons.html>

Name: _____

Day and Night Review