Around the Sun We Go

Summary

Learn about the angle of the Earth and how it effects Utah.

Materials

Globe
Signs to designate north, south, east, west
Directional lamp
Rulers
Blank paper
Protractors
Round objects for circles
Color pencils

- *Temperature Zones*

Additional Resources

Books

- *The Real Reasons for the Season*
  , by Alan Gould, Carolyn Willard, Stephen Pompea; ISBN0-924886-45-5
- *Earth, Sun, Moon*
  , Glen Phelan; ISBN 0-7922-4573-3

Videos

- *Earth's Seasons, Bill Nye the Science Guy*
  , Disney Educational Productions, www.edustation.Disney.com

Background for Teachers

Areas of Earth experience seasonal changes because they absorb different amounts of energy based on the angle which Sunlight strikes the surface and the amount of daylight hours. Earth sits at an angle of 23.45. This angle always points to the northern point regardless of the position in the orbit. As the model of Earth revolves around the light students should be directed to compare hours of light and the size of the shadow. Make sure students have observed shadow size when Earth is in its northern quadrant of its orbit. Due to Utah's position in the northern hemisphere, it receives a relatively short number of daylight hours and the light hits at a steep angle which results in less energy transferred to Earth. As Earth moves counterclockwise through the west, the daylight hours increase as the light rays become more direct.

Intended Learning Outcomes

1. Use Science Process and Thinking Skills.
2. Manifest Scientific Attitudes and Interests.
4. Communicate Effectively Using Science Language and Reasoning.

Instructional Procedures

Invitation to Learn

Use the *Where is the Sun and Earth Survey* and have students participate in a classroom discussion.

Instructional Procedures

Before class begins set up the room with signs marking north, south, east, and west. Set up a directional light in the middle of the room. Attach a staple or some object perpendicular to the surface of the globe to cast a shadow from the light. It also helps if you can darken the room as much as

possible.

With the Earth's axis pointing north and the globe in the northern part of the revolution, have the students observe the amount of the rotation period that has light shining on the staple and the time that it is dark.

Next, have the students observe the length of the shadow. Text printed on the globe makes good reference points for comparison. Guide them back to The Shadow Knows activity and ask them what the length tells them. Once they arrive at the length relates to the angle, ask them to recall Hit Me With Your Best Shot. At this point it is imperative that the students make the connection between the shadows indication of the angle of incidence and the amount of energy that is transferred to the surface.

Move the globe counter clockwise to the west, south, and east. Each time you stop, ask the following questions: When in Earth's rotation does the Sun touch the land we have marked with the staple? What is happening to the amount of daylight hours? What is happening to the hours of darkness?

What do you notice about the shadows length? What does that tell you about the amount of energy transferred to the surface? What season do you think the northern hemisphere is experiencing? Once you have made a complete revolution introduce the southern hemisphere and guide them to discover that the season is an opposite in the southern hemisphere. After this activity, set up a globe and a light. Use heat sensing tape, thermometers, or an infrared gun to measure the globe in the tropic, temperate, and polar zones. Record the data in one-minute increments and have the students create a line graph on the worksheet.

Assessment Plan

Students will create a diagram showing Earth in the four quadrants of its revolution and write a paragraph that describes the relationship between daylight and dark hours, angle of the sun light, amount of energy being transferred and identify the season.

Have groups duplicate the activity with different angles and predict the seasonal changes to Earth.

Bibliography

Crockett, Cynthia. What do kids know and misunderstand about science. *Educational Leadership*, Vol.61.5, pp. 34-37

Active classroom conversations enable students and teachers to examine ideas. Explore them aloud and reason, and re-reason through them. Such conversations can help teachers recognize and challenge students' misconceptions about science. Teachers should not only have conversations with students but also encourage students to have conversations and respectful debates with one another. When we make time for discussion. We get a more thorough understanding of each student's interpretation of the concepts or facts. These discussions enable us to pinpoint students' misconceptions and false ideas early on before the state test and to help students begin to reformulate their ideas into something more accurate and useful.

Hodson, Derek (fall96). Rethinking the role and status of observation in science education. *European Education*, Volume 28.3

The acquisition of new conceptual knowledge depends on the learner's existing conceptual framework and on the structure and organization of the new knowledge. New knowledge has to be firmly anchored to existing knowledge. As a consequence, we need to take much more account than previously of children's own view of the world.

Authors

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