

The Sun Module

Students at this level are familiar with the concept of the earth's tilt and revolution around the sun. However, they may not be aware of the effects of this phenomenon as it relates to seasonal changes. Such changes are revealed by sunrise and sunset directions, lengths of day and night, sun's altitude at noon and the seasonal changes of weather patterns and the nighttime sky.

This program has been designed to clarify these relationships. Your students will be actively involved with plotting the sun's annual apparent path to understand these effects upon the earth.

Student Preparation

Your students should have knowledge of:

- the earth's 23.5-degree tilt and revolution
- measuring the altitude of objects above the horizon
- some familiarity with the zodiacal constellations
- La Nina and El Nino
- the earth's weather patterns

Facts and Concepts

1. The sun's apparent annual path among the constellations of the zodiac is called the ecliptic.
2. The revolution of the earth around the sun and the tilt of the earth's axis to its path of revolution causes:
 - the seasons
 - changes in the position of the sun at sunrise, noon and sunset
 - the seasonal changes of the constellations
 - the sun's apparent path, along the ecliptic

Standards

- S6E2 c. Relate the tilt of the earth to the distribution of sunlight throughout the year and to its effect upon the climate.
- S6E4 b. Relate unequal heating of land and water surfaces to form large global wind systems and weather events.
- c. Relate how moisture evaporating from the oceans affects the weather patterns and the weather events as hurricanes.

Procedures

In the classroom

1. Show the students a star chart with constellations of the zodiac to become familiar with their positions and shape.
2. Ask students to use a globe and light source to demonstrate daily motion, the inclination of the earth's axis, and revolution.
3. Select some of the activities from website:
http://www.thursdaysclassroom.com/index_23sep99.html.

In the planetarium

1. Using a model, rotation and revolution of the earth will be reviewed.
2. The students will be introduced to the cardinal points of the horizon.
3. The vocabulary words will be introduced and demonstrated.
4. Activity sheets will be distributed.
5. The students will plot the sun's position at sunrise, noon and sunset for the equinoxes and solstices.
6. The standards will be developed during this plotting exercise.
7. Review and questioning of observations.

Follow-up activities

1. Have the students discuss how the diagram might look if they were at the North Pole and equator.
2. Have them experiment with shadows outside. Example: Flagpole, shadow sticks and sundials.
3. Discuss changes to the seasons if the earth were tilted more or less. What effect would it have on seasons if the world revolved faster or slower?
4. Discuss how El Nino and La Nina have an effect on local weather.
5. If global warming is true, what future effects might we see in the weather and climate in different parts of the earth?

Vocabulary

meridian	zenith point	cardinal points
vernal equinox	autumnal equinox	altitude
summer solstice	winter solstice	horizon
annual motion	diurnal motion	

Evaluation

Planetarium observation data sheet can be used.

Ask the students to describe in writing and in diagram the causes of the seasons.

Ask questions based on planetarium observations.