



Sun-Earth Day

Celebrate the Connection!

Public Outreach

- Make and Take Activities

What You'll Need

- 1" h x 6" w x 12" length pine board
- 3/8" dowel
- Drill and 3/8" drill bit
- Saw
- Pencil and permanent marker
- Ruler
- Bull's eye level (from hardware store)
- Tacks or small nails to mount level
- Graph paper
- Protractor
- Wood glue, or glue gun and hot glue

NOTE: This project uses a saw and drill, and should be done with the help of an adult!

www.nasa.gov

Solar Shadow Tool

About this Activity

Make a solar shadow tool, and use it to chart changes in the sun's altitude through the seasons. Use the tool to measure the shadow cast by a 4" high dowel. Then draw the measurements on graph paper to find the sun's angle in the sky. Take more measurements, and graph the changes in the sun's angle over time.

(Age range: middle school)

Modified from an activity from: www.solarschoolhouse.org

Preparation

To Make the Shadow Tool

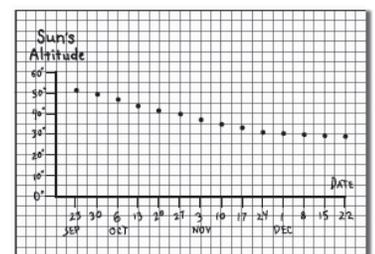
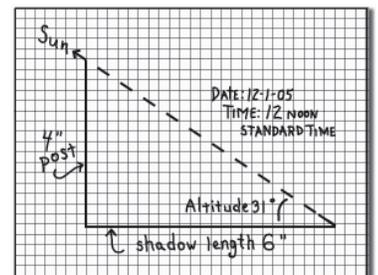
1. Cut a 12" long piece of the pine board.
2. Cut the dowel to a length of 4 and 5/8"
3. Draw a line down the middle of the board.
4. Drill a 3/8" diameter hole through the line about 1" in from one end of the board. Make the hole perpendicular to the board. Glue the dowel into the hole.
5. Mark the line every half inch. Number each whole inch mark, starting at 1" from the base of the dowel.
6. Nail or glue the bull's eye level to the board.



To Do and Notice

To Use the Shadow Tool

1. At noon standard time face the shadow tool towards the sun. (Noon standard time is 1pm daylight savings time.)
2. Align the bubble in the level to make sure the shadow tool is level.
3. Record the length of the shadow.
4. Draw a triangle on graph paper. Use the shadow length as the triangle's base, and the dowel's height as the triangle's height. Draw the hypotenuse. Record the date and time.
5. Measure the angle between the base and the hypotenuse with a protractor. This is the sun's altitude.
6. Take shadow readings once a week from the Fall Equinox (September 23rd) until the Winter Solstice (December 22nd). Record the readings on graph paper to find the sun's altitude.
7. Make a graph of all the sun's altitudes from the Equinox to the Solstice.



To make a more dramatic chart, increase the spacing of the vertical axis.

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