Activity 29:

Earth Clock

Objective: Build a sundial to understand how the sun can help us tell time

Time: 45 minutes

Materials: 4- to 5-foot pole (a broom handle works well), trowel or shovel, hammer or mallet, several softball-sized rocks, acrylic paint, brushes, wristwatch, directional compass, map or globe with latitude marks or computer access to the Internet, protractor

NOTE: Before this activity, find 12 softball-sized rocks. These can be found in the area or donated from a local landscape supplier.

"What happened to your watch?" asked his mother.

Quote from *Weslandia,* by Paul Fleischman

After reading *Weslandia,* ask the students to recall how Wesley knew what time it was in Weslandia. He used a new kind of sundial that used the "movement of the sun" across the sky to create a shadow that would tell the time.

Tell the students that if the sun is shining, they don't really need to use a watch at all, because with the sun, they can make an excellent clock that will never need batteries—a sundial! Tell them that they will learn how to use the sun and our planet Earth to make a particular kind of sundial work. They will make one as a group that will really tell time!

Follow the steps below to make an Earthwork sundial with your group:

1. Guide the students to use a globe to find out the latitude of your location. They may also use a map or visit the resource links at www.jmgkids.us/lit.
2. Take the group outdoors on a sunny day and form a circle 10 feet across on level ground. Have 12 students each choose a rock and use the rocks to establish the circle.
3. Guide the students to use a compass to locate north. Explain that they will point the dial of the sundial toward the north.

4. Dig a hole for the pole at the center of the circle 12 inches into the ground.
5. Place the pole in the ground and make the angle match your latitude. To introduce the concept of angles and degrees of angles, have the students point to one horizon and slowly sweep across the sky until they are pointing straight up. Tell the students that when they are pointing straight across at the horizon, it is not toward the sky at all, so the angle is considered 0 degrees. When they are pointing straight up at the sky, that is 90 degrees.

Guide the students to again point to the horizon and call out, "Zero" and then begin to slowly move their arm up as they count by tens. Have them again stop at 90 as they point straight up.

Explain that the secret to making the sundial work is to place the sloping stick, called the style, in the ground at the same angle of degrees as the latitude of where they are. Have the students recall the latitude they found and then point up at the angle that matches that number.

Tell the group that we can use an instrument called a protractor to measure exactly what that correct angle would be. Guide two students to use the protractor to make the pole's angle more accurate.

6. Once the pole is in the hole you've made, support it with the loosened dirt. Piling rocks around the pole's base will help hold it at the correct angle.
7. "True up" your circle: Once the pole is in position, form a circle small enough that a shadow from the pole crosses the circle. Have the 12 students use a rope to make them all equally distant from the center. Then mark the spots where they stand with their rocks.
8. Go back to the classroom and watch the clock. A few moments before each hour, one student will return to the sun circle. When "the clock strikes," reposition a stone where the shadow of the pointer pole crosses the circle and have a student paint the number of that hour on the stone. Have the group continue as long as possible or until all the daylight hours are marked.

Your group will periodically need to reset the Earth Clock for standard time and daylight saving time.

For more information about sundials or how to make a tabletop sundial, visit the resource links at www.jmgkids.us/lit.