



Sun-Earth Day

Celebrate the Connection!

Public Outreach - Make and Take Activities

Changing Shadows

About this Activity



Participants observe changes in shadows over time. The activity also helps to develop a sense of the Earth's motion. Since this activity requires some passage of time for a noticeable change in shadows, it is best done at the beginning of an event or a series of activities so participants can revisit their tracings after a period of time. At museum or planetarium settings, this might be a good activity to set up at the entrance for visitors to do at the beginning and end of their visit.

Left: A pair of participants returning to trace the second shadow. The first shadow, traced roughly an hour earlier, is outlined in white.

What You'll Need

a sunny area with smooth, flat, ground surface

sidewalk chalks or sticks for tracing, depending on the ground surface of your location

Preparation

Find a sunny area for shadow tracing. It is important to find an area that will remain sunny for the whole duration of your activity.

To Do and Notice

1) Begin the activity by finding out your participants' existing knowledge of shadows. Here are a few examples of ideas that participants might mention:

- The Sun creates shadows, but the Moon creates shadows as well.
- It's dangerous to look at the Sun--NEVER look directly at it!
- If the Sun is shining behind us, we'll see our shadows in front of us.
- A shadow happens when an object (or a person) gets between the Sun or the Moon and the surface of the Earth.

2) Ask your participants to pair up or ask for 2 volunteers. One person will stand while the other traces. Depending on where you are doing this activity, you can trace the shadows with a stick on a smooth expanse of sand or earth or you can use chalk to mark a sidewalk or other hard surface.

3) Explain that the participants will trace their shadows and then come back to the same spot later to see if anything has changed.

4) Begin tracing by outlining the shoe prints of the person casting the shadow, (they'll need to stand in the same spot when they trace again later,) followed by tracing the outline of the shadow.

5) Before the participants continue on with other activities or their museum visit, ask them to predict if their second shadows (to be seen later) will be the same or different from the ones they traced. To make it easier for participants to find their tracings later, ask them to write their names next to their traced shadows. They might also want to write down the time of their first tracing.

6) Return to the traced shadows and ask the same participants to stand in their traced shoe prints. Do a second shadow tracing.

7) Notice any changes in the shadows. The following questions might guide your discussion:

- Did anything change in your tracings? What looks different?
- What do you think made the shadows move? How can you explain that?
- Did the Sun move? Did we move?
- Do shadows change at night too? Why?

Activity Notes

Why did the shadows change? It might seem that the Sun is moving across the sky, but we are really the ones who moved! Most of us have seen a globe or a diagram of the Earth spinning on its axis, but we don't always connect the Earth's motion with the Sun "moving" across the sky or the changes in our shadows.

One simple way to demonstrate this is with a flashlight and a globe (or any round object to represent Earth, with different locations marked on it as reference points.) Shine the flashlight on the globe and notice how a certain location will change from night to day as the Earth spins. If you attach a small figurine or stick on the globe, you will also see its shadow change as you spin rotate the globe.

Another way to demonstrate why the Sun looks to be "moving" across the sky can be done with a stationary reference point, either a sphere held in place to represent the Sun or simply spot on the wall. You or your participants represent "Earth" and stand so that the "Sun" is to your left. Point to where the "Sun" is located. Now slowly rotate counterclockwise (to your left) as the Earth would rotate, finger pointed toward the "Sun" the whole time. Notice how the "Sun" never moved, but to your perspective it went from being on your left (sunrise) to directly in front of you (noon), to on your right (sunset), and to behind you (night).

A fun way to combine these two demonstrations is to print a world map so that it spans the length of a few sheets of paper, enough to wrap a person around the waist. You might want to mark your city or other interesting locations on the map. As the person rotate like the Earth, with the "Sun" flashlight pointing toward the map, others can see your city changing from night to day and again. At the same time, you can do the pointing activity in the second demonstration to notice how the stationary "Sun" seems to be at different places relative to the map-person. See the link below for a "wrap around" map.

This activity is adapted from Eye on the Sky: lesson 5 of Our Star the Sun. See links below for the classroom version of this activity.

Related Websites

Eye on the Sky: Wrap-Around Map

http://eyeonthesky.org/activities_pdf/05sun_dayni_map.pdf

Eye on the Sky: Classroom Version of this Activity

http://eyeonthesky.org/lessonplans/05sun_daynight.html