



## **Paper Plate Sundials—Telling Time with the Sun**

People have been telling time with the Sun and its shadows for a very, very long time. This activity links us to our past and the human inclination to use astronomy to mark hours, days and seasons. The activity can easily be connected to many cultures and through use of the universal concept of time.

**How long?** 15 minutes to make and set up sundials. Documenting shadows with tracing can be done over 30 minutes or, better yet, several hours.

**How large a group?** 5-10 people (adults and children together is great!)

### **Learning objectives?**

Build sundials and observe shadows over time.  
Identify patterns of change in the shadows.

**What do I need to prepare?** Collect materials and find a sunny spot (without too much foot traffic) to place your sundials.

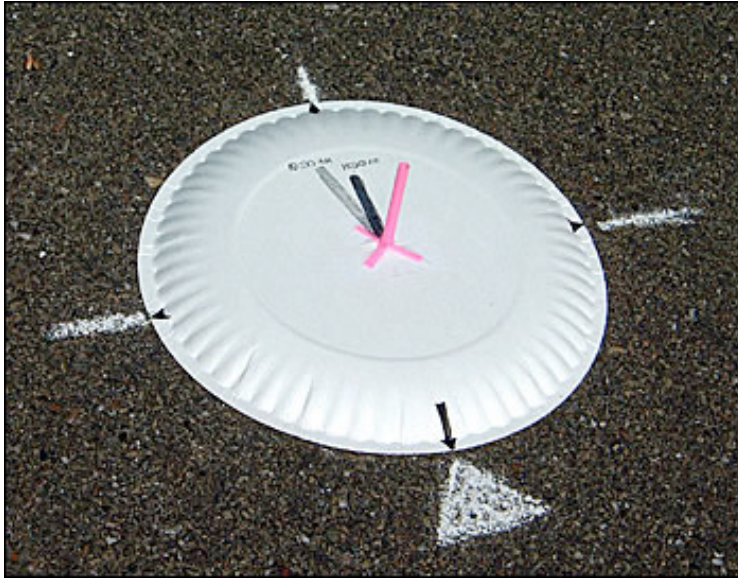
### **What do I need?**

- Paper plate
- Plastic straw
- Tape or use a small dab of playdoh or clay
- Scissors and pencil (*TIP:* if you pre-cut the straws, you won't need scissors for the activity!)
- Small rock to keep your sundial in place.

### **Building Sundials**

1. Cut the straw into 3-4 inch long sections.
2. Make a few 1/2-inch cuts in one end of the straw. Flare-out the cut portions of the straw and tape it onto the center of the paper plate. (The straw should be perpendicular to the surface of the plate.)
3. Draw an arrow pointing to the edge of the plate and label it "north."
4. Take a look around and determine where north is. Place the plate so that the arrow is pointing in a northerly direction. (You can use a smart phone to find north.)

5. Place the sundial in a sunny spot and trace the straw's shadow with a pencil.



6. Fill in the outline and write the time at the tip of the shadow.
7. Ask visitors to take multiple measures over the course of an hour (or more is better) and see how shadows move and change length. Keep in mind that for repeated measurements it is important to place the sundial in the same location, always pointing north.



8. Some questions to consider, especially if you have more than an hour to collect shadow data:
  - When was the shadow the longest? Where was the Sun?
  - When was the shadow the shortest? Where was the Sun?
  - Why do you think the shadows change length? How can you explain what you are seeing?
  - How could you use a shadow to tell the time of day?
  - Where do you think the shadow would be if you came back in 3 hours? What do you predict it will look like?
  
9. Possible questions to help relate this activity to your site:
  - Over the course of time that people have been associated with or lived on this landscape how did people tell time? What does that tell us about their lifestyles, the pace of their lives as compared with today?
  - Is there evidence at this site, of people having used the sun as a clock? What tools did they use?
  - Ask people how they might estimate the number of hours of daylight remaining on any given day, without a clock or sundial handy. One rough estimate is to extend your hand to arm's length with fingers pointing to the side, such that the sun appears to rest on the index finger, then count how many finger thicknesses there are to the horizon – each finger represents about 15 minutes. People can use this to figure out when it's time to turn around on their hike in the park, to be sure they are not caught out in the dark :-)

You can encourage your visitors to decorate their sundials with images of local animals and plants or sun-related images (think rainbows)!