

# CURIOSITY AT HOME

## SHADOW TRACKING



*Long before people had electricity, gears or batteries, they were able to keep track of time by using the Sun. Throughout the day and year the Sun's position changes. You can use this change to tell time. The easiest way to use the Sun is to create a shadow. This shadow will change position as the Sun moves throughout the day.*

### MATERIALS

- Science notebook
- Sidewalk chalk

You will also need a sunny day, and a friend to help you.

### PROCEDURE

**Note:** it's best to begin this activity in the late morning, and continue it until late in the afternoon.

- On a Sunny day, stand outside on concrete, pavement or other hard surface so that you can see your shadow. Using sidewalk chalk, have someone else draw the shape around your feet. This will mark where to stand each time you do this.
- Have the same person draw the outline of your shadow. Write down what time it is by the shadow outline.
- Look to where the Sun is (without looking directly at it.) Make a note of it's location in your science notebook. (It can be helpful to compare the location of the Sun relative to a tree or building.)
- Wait at least 30 minutes, and then stand in your footprints again, and draw your new shadow location. Write down the time.
- Pick a new time that you plan to trace your shadow, and make a prediction: where will your shadow be? Mark an "x" where you think the top of your shadow will be at that new time.
  - › At the correct time stand in your footprints and check your prediction. Were you correct?
- Make several more observation during the day, each time tracing the shadow and marking the time.

*Experiment continued on next page...*



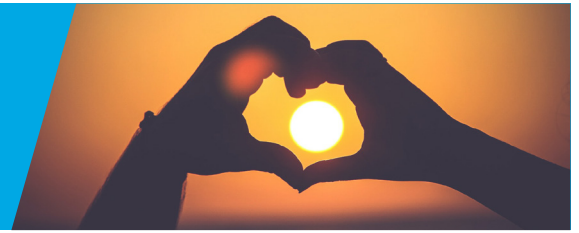
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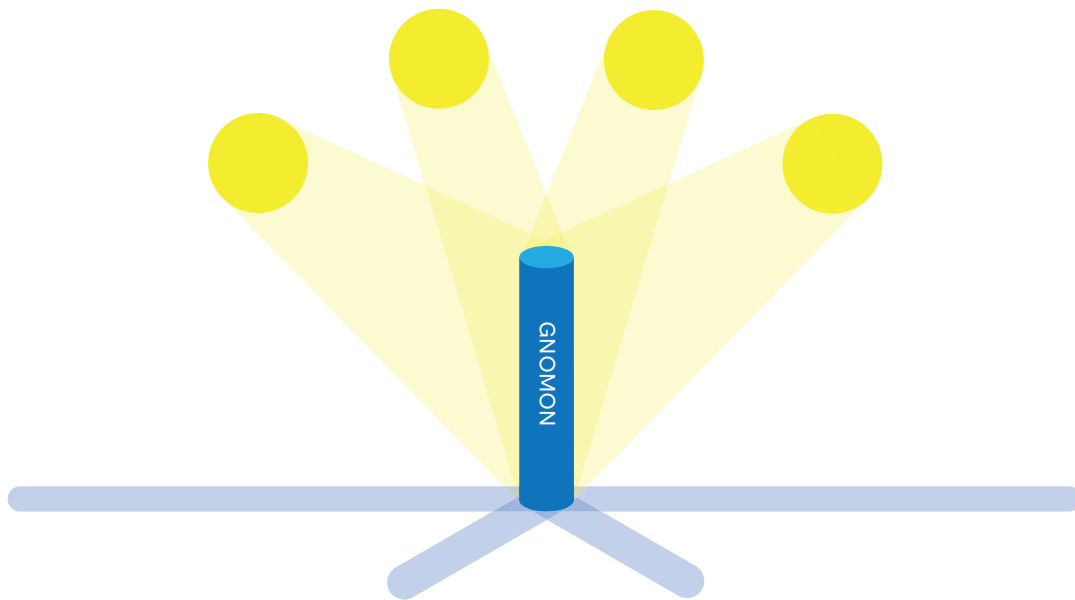
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### WHAT'S HAPPENING?

The Earth is moving around the Sun, causing the Sun to be in different parts of the sky during the day. The position of the Sun in the sky at different times is very predictable, and can be used to tell time by making a sundial. Sundials have two important parts: something that casts a shadow and the markings to tell the time.



A gnomon is the part of a sundial that casts a shadow; for this experiment, you become the gnomon because you are casting a shadow! The shadow you make will change over the course of the day; it will get shorter towards the middle of the day when the Sun is highest in the sky, and the shadow will get longer later in the day as the Sun appears lower in the sky. When the Shadow is pointing directly north, the Sun is due south; this is called "local noon". It's 'noon' based on the Sun's location, but it might be a little before or after noon according to clocks. If it's daylight savings time, 'local noon' might even be an hour different from the clock!

*Experiment continued on next page...*



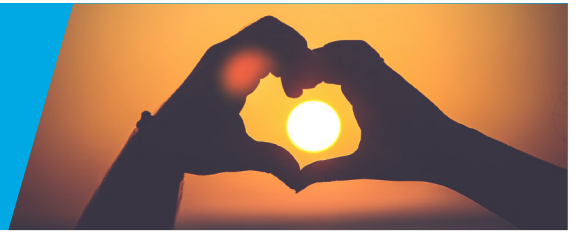
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### 6–8 GRADE EXPLORATION

Explore these questions and record answers in your science notebook.

- Looking at your shadow, what direction did it seem to move?
- Compare the movement of the shadow to the observations you made of the Sun; how do they compare?
- Did your shadow length change or stay the same during your observations?
  - › If it changed, when was it longest? When was it shortest?
- Where do you think the Sun would have to be for you to not have any shadow at all?
  - › Using a flashlight and a model for yourself (a toy action figure works well), test your prediction. Were you right?
- If your chalk is still visible the next day: without knowing what time it is, stand in your footprints again. Can you guess what time it is based on your shadow?



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