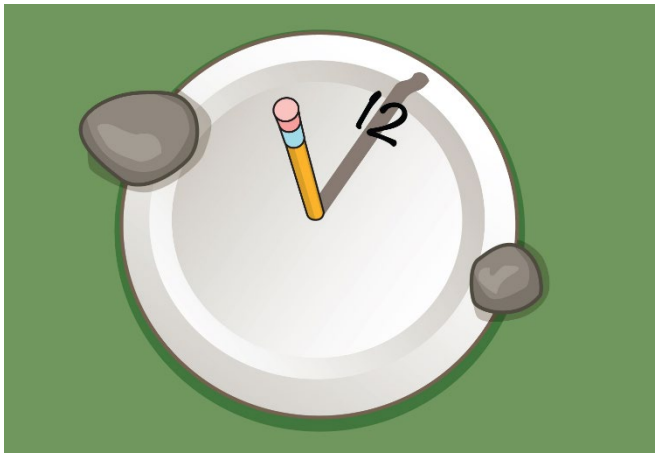
Day 7 Light: Sunlight Part 2

Science

A sundial is a tool that helps us determine the time of day, based on the position of the sun in the sky.

A sundial is an instrument with a pole, or gnomon, in its center and markings that tell the time like a clock. When the sun shines on the gnomon, shadows are cast, or appear at different markings on the sundial. This is a sundial. Its gnomon has a shadow that indicates the time on the sundial.

Create your own sundial using the attached instructions!

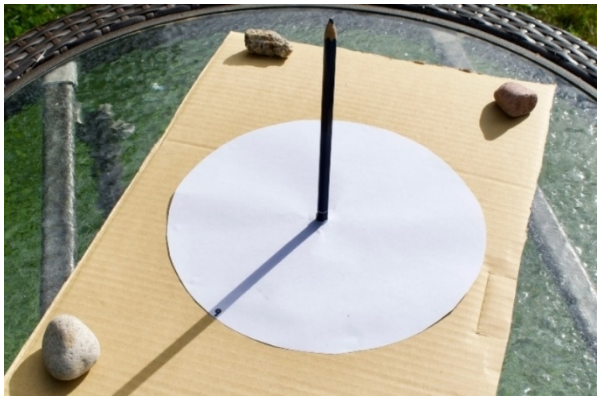


Additional resource:

Measure shadow distance
http://ow.ly/Ub3P50APF5O

WQED education

Make Your Own Sundial



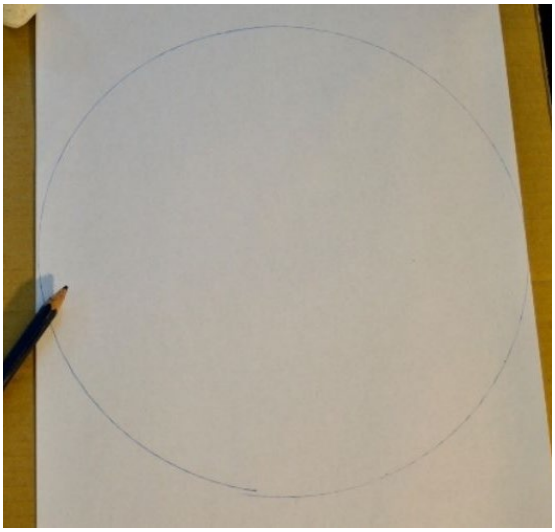
Following the movement of a shadow during the day is a way to track time. Try it yourself by making a sundial.

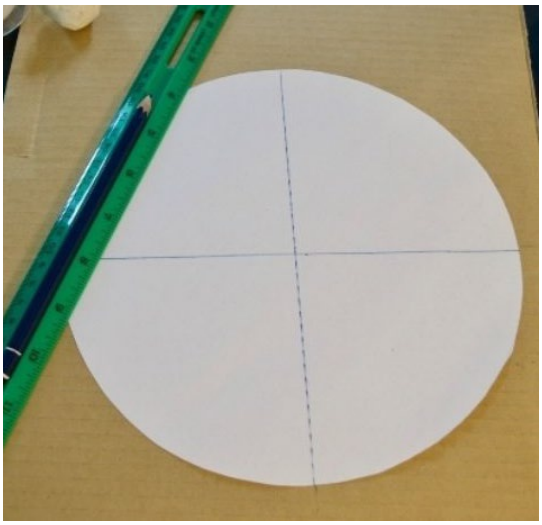
A very long time ago (long before there were digital clocks and mobile phones), people used a sundial to tell time. A sundial may consist of a round plate with a vertical stick, called a gnomon, that casts a shadow on the dial. On the plate of the sundial are numbers for each hour of the day. The gnomon's shadow points to the time.

Materials

- ☐ Construction paper (pale color works best) or a 9- to 12-inch paper plate
- ☐ Piece of stiff cardboard (should be a little larger than your piece of paper)
- ☐ Large bowl (for tracing)
- ☐ Pencil or crayon (for tracing)
- ☐ Scissors
- ☐ Pencil or other straight stick (the gnomon)
- ☐ Mounting putty or soft clay
- ☐ Four small stones or clear tape (for securing your sundial when it's outside)
- ☐ Marker (dark color works best)
- ☐ Compass (optional)
- ☐ Ruler (optional)

1. Turn your bowl upside down on your piece of paper and trace a circle. Cut out the circle.

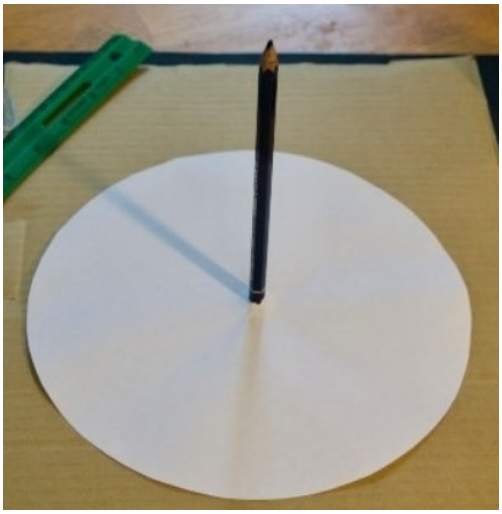




2. Poke a small hole in the center of the circle. (An estimate is fine, or you can use a ruler to find the center.) The hole should be no wider than the pencil or stick you'll use for the gnomon.

3. Place a small ball of mounting putty or class in the center of the piece of cardboard, and push the eraser-side of the pencil (gnomon) into the putty. Test to make sure the pencil stays upright.

4. Once your pencil is secure, slide the paper all the way down to the cardboard and press firmly to flatten the putty/clay. If there are marks on one side of the paper, keep the blank side up.



5. Find a flat spot outside that will stay sunny for all or most of the day and place your sundial on the ground or outdoor table. Choose a spot that won't be disturbed by foot traffic, including the muddy paws of your favorite four-legged friend. (Ahem, Hal.)

6. Secure the base of your sundial so it won't move using either small stones or clear tape. It's important your sundial stays in the same place while you are making it.

7. Check the time and set an alarm for a few minutes before the beginning of the next hour.

8. When your alarm sounds, head outside to your sundial with the marker. Where the shadow meets the edge of the circle, write the time (whole hours only). Set your alarm for the next hour and repeat until your sundial is in the shade or the sun sets and there are no more shadows.

9. If it isn't going to rain, leave your sundial in place and use it to tell time the next day.

Tips for Success

Check the weather forecast. You'll need a sunny day to fill in your sundial. Two or three sunny days in a row will let you use your sundial to tell time once it is finished!

Prepare your sundial the day before it will be sunny so you are ready to start filling it in the following morning.

A Closer Look at Sundials

Today, we often like to know exactly what time it is. Sometimes down to the second! But a sundial doesn't even count minutes. It also doesn't work on cloudy days or at nighttime. And you can't wear one on your wrist! What do you think it would be like to tell time with a sundial for a day?

Head outside to your sundial with a compass. At noon, the gnomon's shadow on your sundial should point towards north (unless you live in the southern hemisphere). Toward which direction does the shadow point at 3 or 9?

Day 7 Light: Sunlight Part 2

Social Studies

How did people keep track of time before clocks? Read this article to find out!

Wonder of the Day **#1820**

How Did People Keep Time Before Clocks?

TECHNOLOGY — Inventions

Have You Ever Wondered...

- How did people keep time before clocks?
- What were some of the earliest timekeeping devices?
- Why are sundials not always reliable?

As you make your way through a typicalschool day, you're probably very aware of what time it is. School probably starts around 8 or 9am. You probably know exactly what time recess and lunch occur. You're probably also aware that school gets out around 2:30 or 3:30pm. How do you keep track of all these different times?

Fortunately, thanks to modern technology, there's no shortage of timekeeping devices you can rely upon. At home, you probably have at least one clock on the wall. You may also have appliances, such as a microwave or an oven, that have clocks.

Some kids wear a wristwatch to keep track of the time throughout the day. In lieu of a wristwatch, other kids might rely upon a smartphone instead. At school, every classroom likely has a clock on the wall.

Have you ever WONDERed, though, what people did before modern clocks were invented? How did they know what time it was? How did they keep track of appointments? How did they know when they needed to be somewhere?

Although we can't know for certain how the earliest human beings kept track of the time, scientists believe they probably relied upon the natural world around them. For example, historically, humans have relied upon the movement of the Sun across the sky to track time.

Historians believe many ancient peoples, including the ancient Babylonians, Egyptians, Chinese, and Hindus, divided the Sun's cycle into different timekeeping periods. The ancient Egyptians, for example, built tall obelisks that would cast shadows to help divide the day into sections. These obelisks worked in much the same way as sundials, which were a popular means of timekeeping long ago. Of course, sundials didn't help much at night or on cloudy days. To help keep time when it wasn't sunny, ancient peoples also learned to track the movement of the planets and constellations after dark.

Other devices were developed over time, including hourglasses and water clocks. These devices relied upon the time it would take a particular substance, such as sand or water, to move from one

part of a container to another. Rather than clocks, though, these devices were more like timers.

How did people long ago set up a meeting at a certain time in the future? Some historians believe many people relied upon a technique as simple as pointing to an area of the sky. When the Sun reached that point, that's when you would meet the next day.

Of course, humans, being the clever creatures we are, relied upon a variety of natural solutions to the problem of timekeeping. For example, many people simply trained their bodies to wake up at the first light of dawn. Others may have relied upon animals, such as roosters, as alarm clocks.

If people had to be up before dawn, they might have relied upon the full bladder method. By drinking a lot of water before going to bed, they would be assured of waking up in the middle of the night to go to the bathroom!

https://www.wonderopolis.org/wonder/how-did-people-keep-time-before-clocks

Day 7 Light: Sunlight Part 2

Math

NAME _____

Tell Time on a Sundial

Sundials are like clocks. The gnomon acts like a clock hand and lets us know what time it is. Can you use the sundials on this worksheet to figure out the approximate time?

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WQED education

Day 7 Light: Sunlight Part 2
English Language Arts

NAME _____

A World Without Time

After reading about how people kept track of time before there were clocks, you are going to write a paragraph explaining how our lives would be different if we didn't have a way to keep track of time (Ex. How would you know when to be at school? How could you tell someone when you would meet them at the playground?, etc.) Do you think you would like it? What would be easier about life? What would be more difficult? Write your paragraph on the lines below.

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