

ACTIVITY



MAKE YOUR OWN SUNDIAL

SUPPLIES

- * world map or globe
- * protractor
- * stiff paper or cardstock wider than the protractor
- * pen and pencil
- * cellophane tape

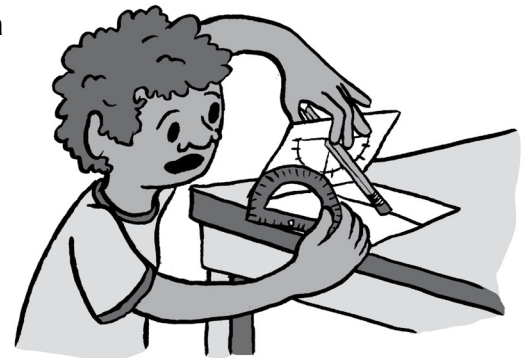
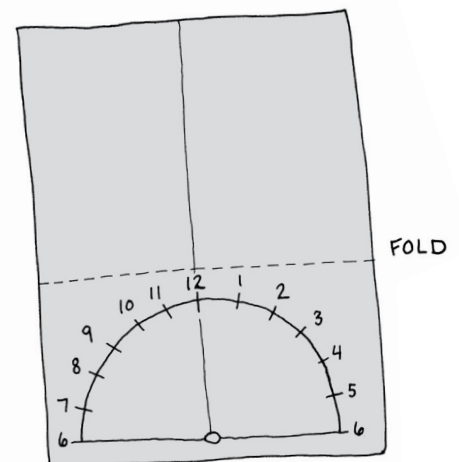
1 Look on a globe or map and find the approximate latitude of where you live. Latitudes start at zero at the equator and go to 90 degrees north at the North Pole and 90 degrees south at the South Pole.

2 Set the straight edge of the protractor a half inch (1 centimeter) from the short edge of the paper. Trace around the protractor. Make a dot at the center of the straight edge. Make marks at every 15 degrees around the semicircle and number these as hours as shown here.

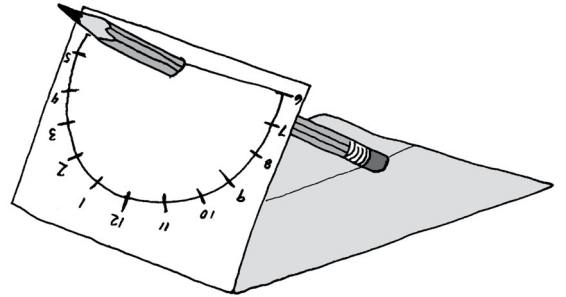
3 Make a pinhole through the center dot. Turn the paper over and set the center hole of the protractor on top of the pinhole. Trace around the protractor like before and make marks again every 15 degrees with the hours numbered. You now have two semicircles back-to-back.

4 On one side, draw a line perpendicular to the straight edge of the semicircle, from the pinhole down the length of the paper. Fold the paper about a half inch (1 centimeter) from the edge of the semicircle so this line is on the inside.

5 Push the pencil through the pinhole so it points to the outside of the fold. Set the paper on a table so the eraser end of the pencil is on the table. Position the paper so the pencil is perpendicular to the semicircle and is resting on the line you have drawn. Set your protractor next to the pencil so the center hole of the protractor is in line with where the pencil meets the table.



ACTIVITY!



6 Move the pencil along the marked line until the pencil makes the same angle with the table as the degree of longitude where you live. Be sure while you do this that you move the paper so that you keep the semicircle perpendicular with the pencil.

7 The pencil is called the gnomon. A gnomon is an object that casts a shadow to keep track of time. To tell time, look at the shadow of the gnomon on the upper side in the summer and on the underside in the winter. Look at a clock to see what time it is, and subtract one hour if it is daylight saving time. Orient your sundial to show the same time. Tape the pencil to the paper or table. It's now a working clock!

What's Happening?

Shadows change direction depending on the time of day. As the earth rotates and the sun moves across the sky, shadows also move. In the morning, your shadow will stretch out behind you to the west, but in the evening it will stretch to the east. The shadow on your sundial does the same thing.

This type of sundial is called an equatorial sundial because the face of the sundial (the semicircle) is parallel to the equator. The gnomon is parallel to the imaginary axis that the earth spins around. The position of shadows also changes somewhat depending on latitude, which is why the face of your sundial has to be positioned for the latitude where you live. If you live at the equator, your latitude is zero, and the sundial would be perpendicular to the ground and exactly parallel to the equator. If you were at the North Pole, the pencil would be exactly vertical.

The position of shadows also changes somewhat with seasons. Your clock will be most accurate if you orient it on April 15, June 10, September 1, or December 20.