Simple Sundial

The time of day can be told by observing the changes that take place to a shadow. Remember that a day is the time it takes the Earth to revolve once around its axis. However, because we stand on the Earth as it moves, we don't perceive the movement. To us, the sun seems to move (actually, the sun does not move at all). As a day unfolds, the sun appears to cross the sky, beginning low in the East at dawn, reaching its highest point in the sky around noon and sinking back low in the West at dusk until, finally, it dips below the horizon during the night. The changing position of the sun in the sky causes shadows on Earth to change throughout the day. When the sun is low (early or late) shadows are long, but when the sun is high in the sky (around noon) shadows on Earth are short. The positions of shadows also change with the sun, moving around as the day goes on.

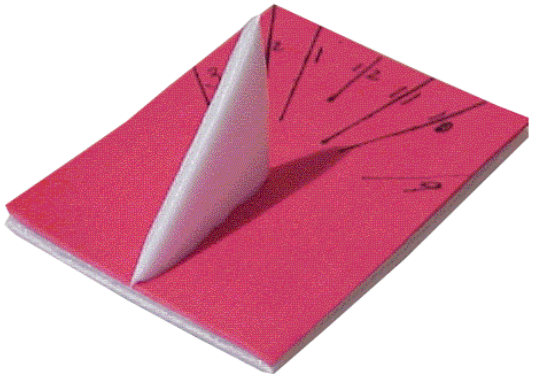
Sundials are devices that enable people to tell the time of the day by showing the position and length of a shadow. The sun shines on a centerpiece called a gnomon. The shadow of the gnomon moves around the face of the sundial, which can be calibrated with the hours of the day to tell time.

Sundials are some of the earliest time keeping devices invented by humans. The first dials were invented in ancient Egypt. In fact, a fragment of the earliest known sundial (now on display in a German museum) dates from around 1500 BCE. As people moved into villages and cities, being able to coordinate activities such as meetings and meals became important. Sundials told everyone in a particular location the same time.

Sundials probably started out simply as a stick in the ground but humans made them very accurate over time. One of the most important improvements was the angled gnomon. Because the Earth is tilted on its axis, light from the sun hits the planet differently throughout the year. This affects the position of a shadow, making it differ greatly from summer to winter. To correct this difference and get accurate time throughout the year, around 100 AD, sundial makers began to angle the gnomon to match the latitude of the Earth at a certain location.

Materials

1 styrofoam tray
construction paper
scissors
ruler
protractor
pen/pencil
glue
compass
watch



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To Build:

1) Cut off the curved edges of the tray.
2) Cut a 3 inch X 3 inch square of paper and a 3 inch X 3 inch square of styrofoam from a corner of the tray.
3) Glue the paper square to the styrofoam.
4) Cut a right triangle from the foam next to where you cut out the square. The hypotenuse of the triangle should be 2 inches and at an angle equal to your latitude. This is the gnomon.
5) Glue the gnomon upright on to the square. The primary angle of the gnomon should be located at the midpoint of one of the square's edges allowing the hypotenuse to extend toward the center of the square.

To Use:

1) Set your sundial in a sunny, level spot outside and, using a compass, point it North.
2) Use a watch and, over the course of a day, mark the position of the shadow of the gnomon on the face of the sundial once an hour. Write the hour near the mark.

You now can tell time during the day without your watch every time the sun shines!