



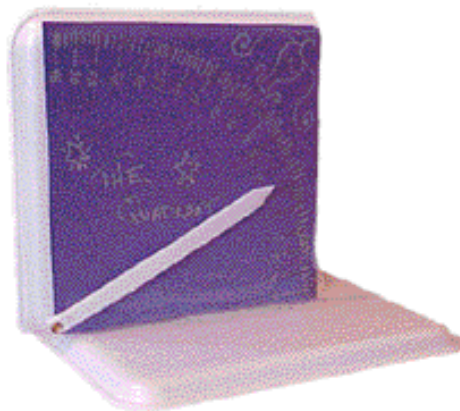
The Quadrant

Quadrants are tools that have been used for over 1000 years to find latitude. Latitude is a measurement, in degrees, of the angle between the horizon at a given point on Earth and the North or South Pole. In the Northern Hemisphere, the North Pole is located by looking to the North Star (also called Polaris), which is positioned directly above the Pole. Therefore, in the North, latitude is the angle between a location on Earth and Polaris. Latitude can be used to find a locality on the planet and is represented by the horizontal lines on a globe.

Latitude is important to telling accurate time by a simple sundial. A simple sundial uses the changing position of a shadow to show time throughout a day. However, because the planet is tilted on its axis, the sun hits the Earth differently at different latitudes on its surface. This causes shadows and, thereby the time on a sundial, to differ from location to location. In order for a shadow to show correct time, the gnomon or vertical piece of a sundial needs to be set at an angle equal to the latitude of the locale of the sundial. The angled gnomon casts a shadow on a sunny day that OR Because the gnomon is angled to match latitude, the shadow it casts.....

Materials:

- 2 styrofoam meat trays
- scissors
- pen/ pencil
- marker
- 2-3 pieces of construction paper
- ruler
- protractor
- glue
- clear packing tape
- 1 brad
- 1 toothpick





The Quadrant

To Do:

- 1) Cut out an 8" X 8" square of construction paper.
- 2) Starting in the lower-left corner of the square, draw one line across the width of the paper, 1/4" above the bottom and draw one line across the height, 1/4" from the paper's edge.
- 3) Position the protractor in the lower-left corner of the square so that its center point is on the point where the lines meet, the guide point.
- 4) Using the protractor, mark lightly on the paper with a pencil or pen all of the degrees between 0 and 90.
- 5) With the ruler, draw light lines from the guide point through each degree mark. Extend these lines out to the edges of the paper.
- 6) Glue the paper to the flat back of a meat tray making sure that the lower-left corner of the square is as close as possible to the lower-left corner of the tray and that the bottom is about a 1/2" above the bottom edge of the tray.
- 7) Cut off the remaining length of styrofoam not covered by the paper square. Keep this scrap piece.
- 8) Cut out a 1/2" X 7 1/2" length of styrofoam from the scrap piece. Cut one end into an arrow to make a pointer.
- 9) Push the brad through the pointer at a point about 3/16" in from the edge of the non-arrow end.
- 10) Push the rest of the brad through the covered meat tray at the guide point.
- 11) Using the pointer as a guide, draw short lines with the marker along the degree lines on the paper to highlight each degree. Label the lines at 5° intervals.
- 12) Cut the tips off of the toothpick and stick them into the pointer, one near each end.
- 13) Cut out two tabs from the 1/2" wide length of tray under the paper.

Congratulations! You have now made a quadrant. Now you need to mount it.

- 1) Cut two slots in the remaining meat tray that will fit the quadrant's tabs. IMPORTANT: Make sure the slots are positioned so that the lower-left corner of the quadrant slightly hangs over the edge of the bottom tray.
- 2) Fit quadrant into slots. Use the packing tape to secure the quadrant making sure it stands up straight.

To Use:

- 1) Set the quadrant on a level surface outside at night, after 9:00pm. Make sure it is a clear night and that you can see the North Star. Use a planetsphere or check <http://www.mtwilson.edu/Services/StarMap/> to find the position of the North Star (also called Polaris) in the sky.
- 2) Point the quadrant in the direct of the North Star (North) and position the pointer so that it lines up with the star.
- 3) What degree is your pointer indicating? That is the latitude for your location.