DARK as a SHADOW

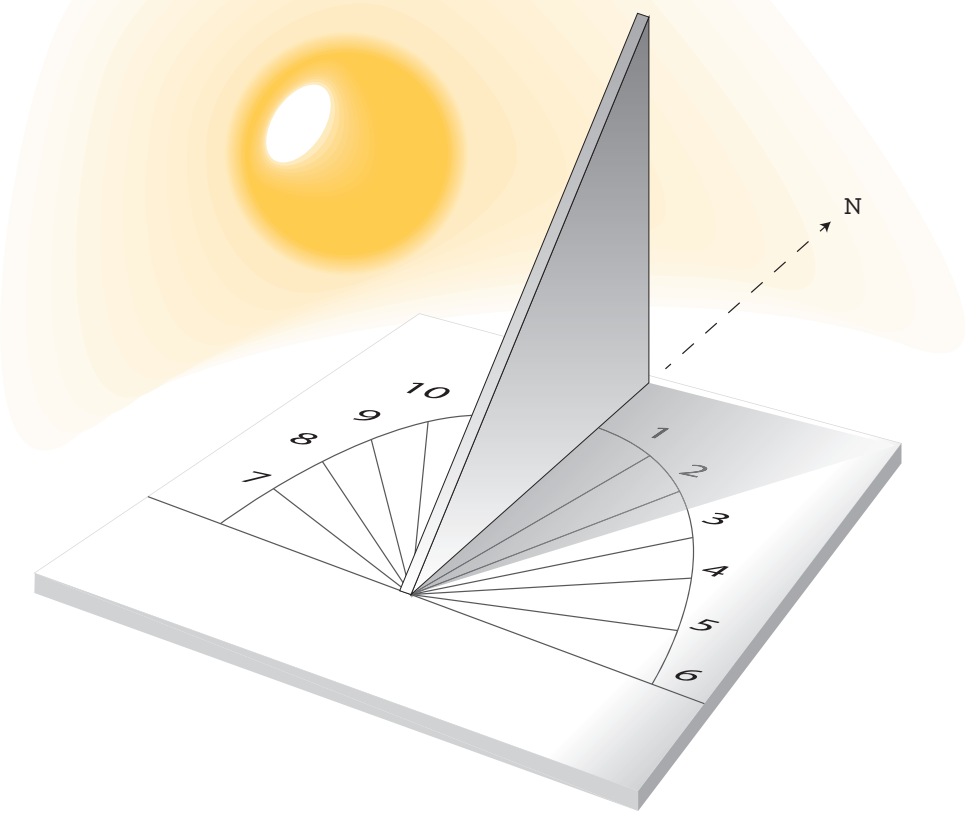
Making a Sundial

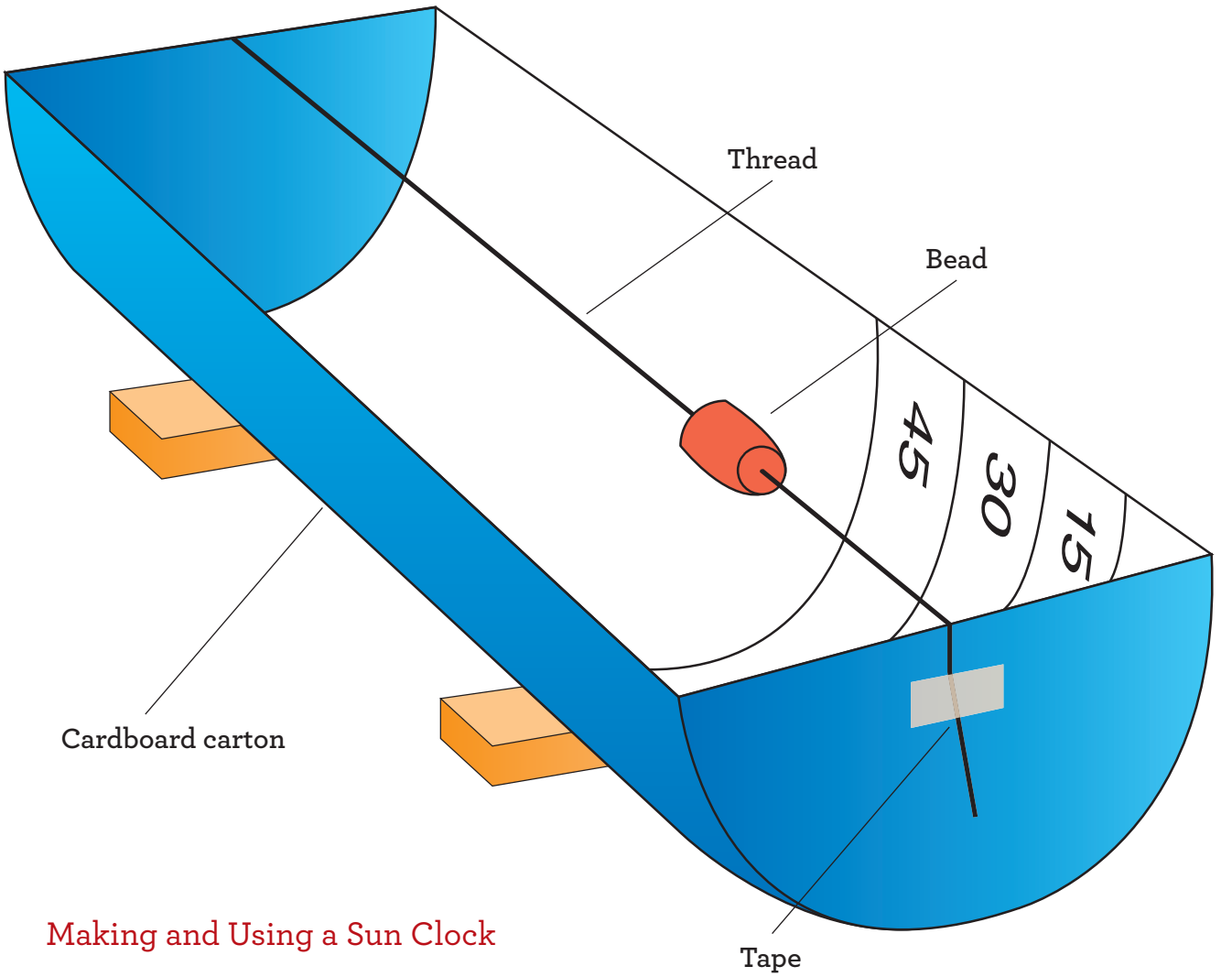
The relative positions of the Sun and Earth relate to time and seasonal changes. The shadows that are cast by the relative positions can be used to measure time and observe seasonal changes.

Use a protractor to make a half circle on a 10 inch (25 cm) square of cardboard. Divide the circle into 12 15-degree angles and number them. Determine the latitude of your school. Some latitudes are given below:

St. Paul, Minnesota	45 degrees
Philadelphia, Pennsylvania	40 degrees
Los Angeles, California	34 degrees
Miami, Florida	26 degrees

Out of stiff cardboard, cut an angle that is the same as the number of degrees of latitude (e.g., if you live in Los Angeles, the angle would be cut at 34 degrees). Fasten the angle to the half circle with tape. Place the sundial in sunlight so that the triangle points directly north. North is best determined by noting the direction of the line made when the shadow is at its shortest length. The shadow line is along the north-south line. The shadow cast will indicate the time of day in your location. Similar sundials can be made by sticking any upright object such as a pencil or dowel into the ground and slanting it to the angle of latitude in the direction of north. You can mark the top of the shadow every hour for many days and connect the marks to see changes in the apparent course of the Sun.





Making and Using a Sun Clock

Cut a round cardboard carton in half lengthwise. Glue a bead to a length of thread. Fasten the thread through the centers of the carton's ends as shown. Place the instrument on a level windowsill or outdoors in precisely the same position each day by lining the thread up in a north-south direction. The thread's shadow will indicate Sun time. Mark the interior of the carton at 15-minute intervals where the bead's shadow is cast. By connecting these marks, you will note a shift in the Sun's apparent path with the seasons.