



## Universal Sundial

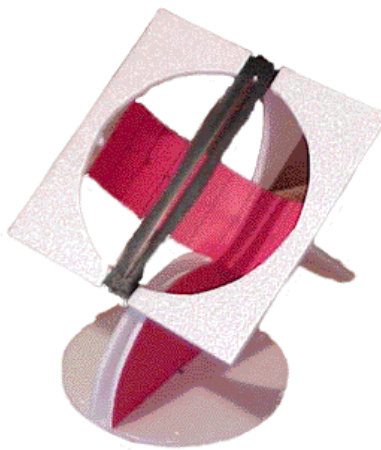
The simple sundial tells time accurately for a specific location, but does not work when the device is moved to a different latitude. The fixed gnomon of the simple sundial can not be adjusted. Instead of building thousands of simple sundials all over the world at every latitude, the universal sundial was developed which can tell time by the sun anywhere on the planet. The gnomon of the universal sundial can be adjusted for any latitude.

Universal sundials were used through the beginning of the 19th Century. With their development, the telling of time became portable. These new devices could be moved anywhere the sun shined and often were made small enough to fit into a pocket. They were the prototype of the watch. Lafayette gave a small universal sundial to George Washington to tell time during the American Revolution.

The portability of the universal sundial made time personal. No longer did people have to rely on a common sundial in a fixed location. They had their own timekeeper that they could take anywhere.

### Materials

- 2 styrofoam meat trays\*
- construction paper
- scissors
- ruler
- protractor
- pen/pencil
- templates
- electrical tape
- glue
- compass



\*styrofoam meat trays can be found in most supermarket meat departments



## Universal Sundial

### The Universal Sundial

- 1) Cut off the curved edges of 2 trays.
- 2) Using the templates, cut the parts out of the styrofoam.
- 3) Fit SA into SB and set aside.
- 4) Cut a 6 inch piece of electrical tape in half, lengthwise. Tape these pieces across the inner circle of C. The pieces of tape should be on either side of the middle of C with a small space between them. The star marks on the template of C indicate the middle. Set aside.
- 5) Cut out an 8 inch X 2 inch strip of paper. With a pen, draw lines across the width of the strip at 5/8 inch intervals. Label these lines 7, 8, 9, 10, 11, 12, 1, 2, 3, 4, 5.
- 6) Glue the strip to one of the inside curves of A and B making sure that the 12 line is in the middle.
- 7) Glue C over A and B so that when you look through C, the space between the pieces of tape is above the 12 line on the paper strip. Set aside.
- 8) Cut out a semi-circle of paper that matches the shape of D. Glue the paper to D. With the protractor, mark 0 - 90 degrees onto the paper covering.
- 9) Glue D upright, near the middle of F.
- 10) Glue E upright next to D with enough space between them to slide in a corner of A and B.

### To Use:

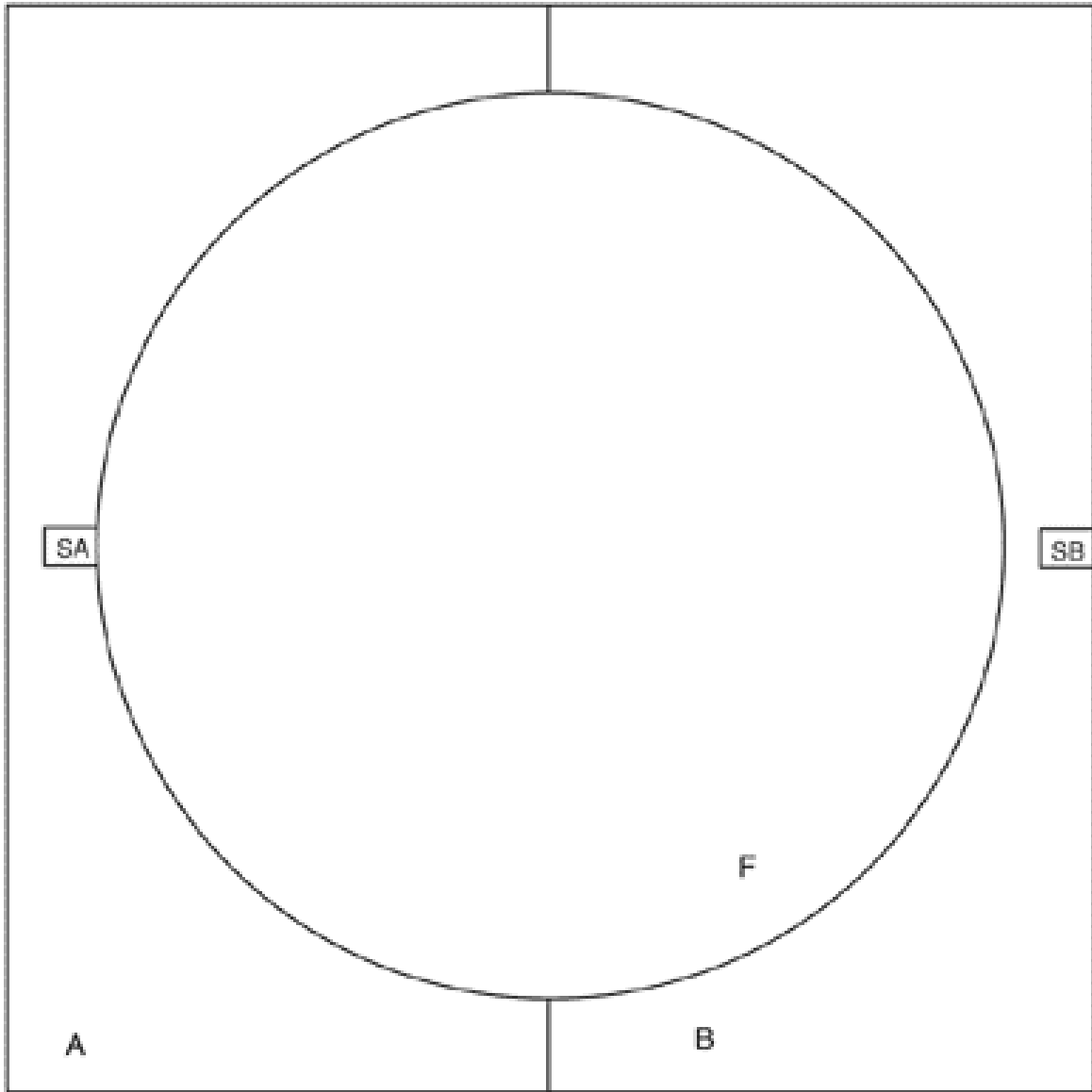
- 1) Set your sundial in a sunny, level spot outside and, using a compass, point it so that its back faces North.
- 2) Using the degree markings on the side of the sundial, adjust the angle of the face to match the latitude of the location.
- 3) As the sun shines, a shadow of the two pieces of tape across the sundial's face will fall over the numbered strip of paper. The sliver of light in the middle of that shadow indicates the time on the numbered strip. The pieces of tape act as the gnomon in this universal sundial.

### Questions

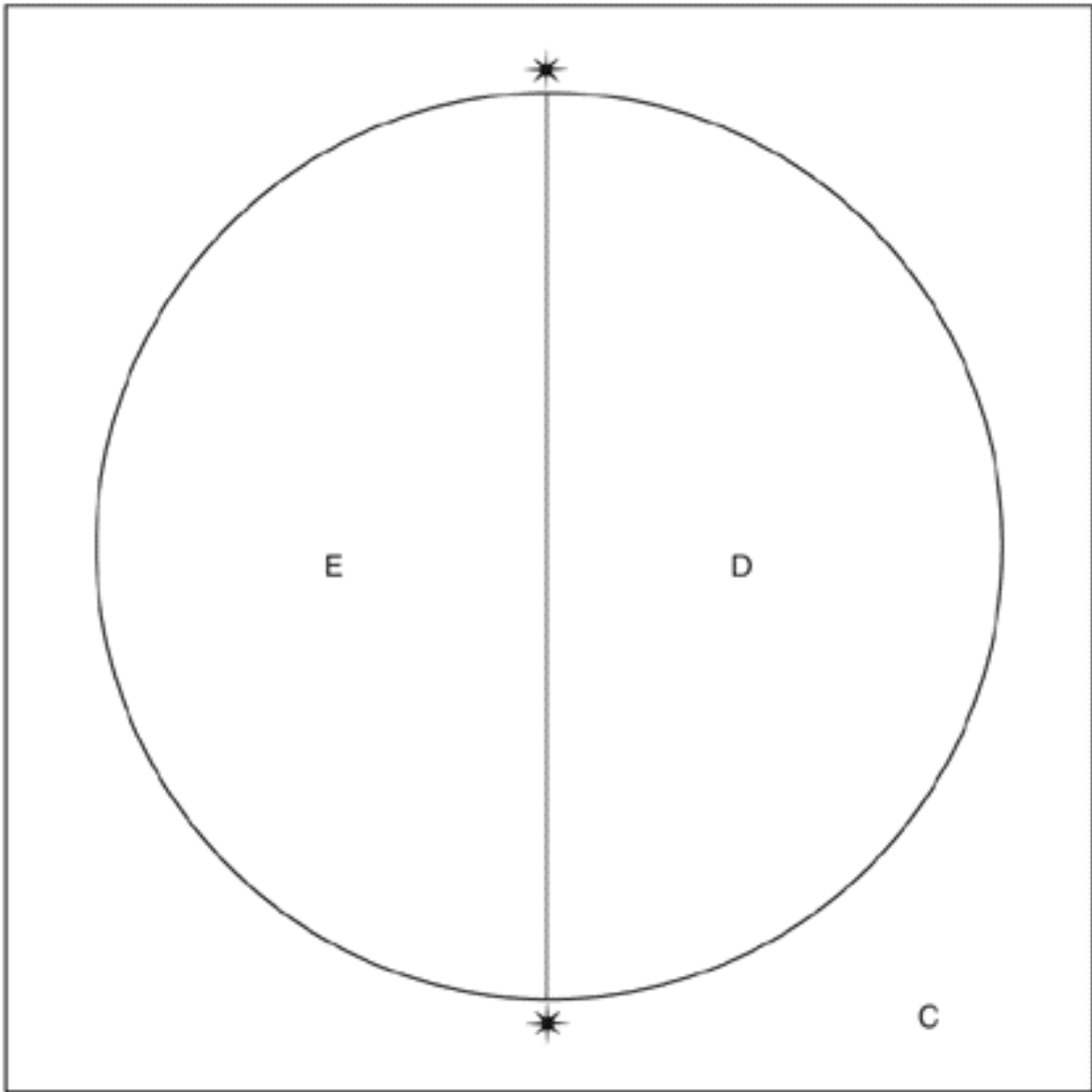
How accurate at telling time is your Universal Sundial?

Does it remain accurate if you move it to different latitudes?

Do you think the portability of the universal sundial changed people's lives when it was developed? If so, how were they changed?



# Template 1



## Template 2