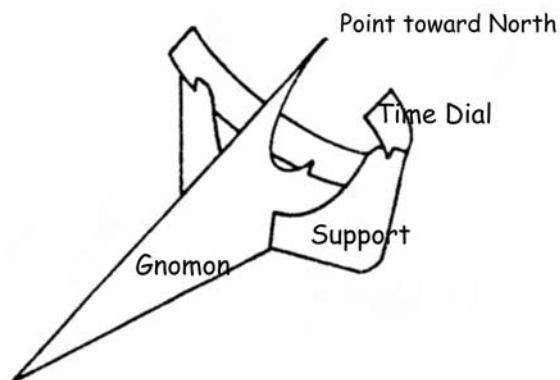
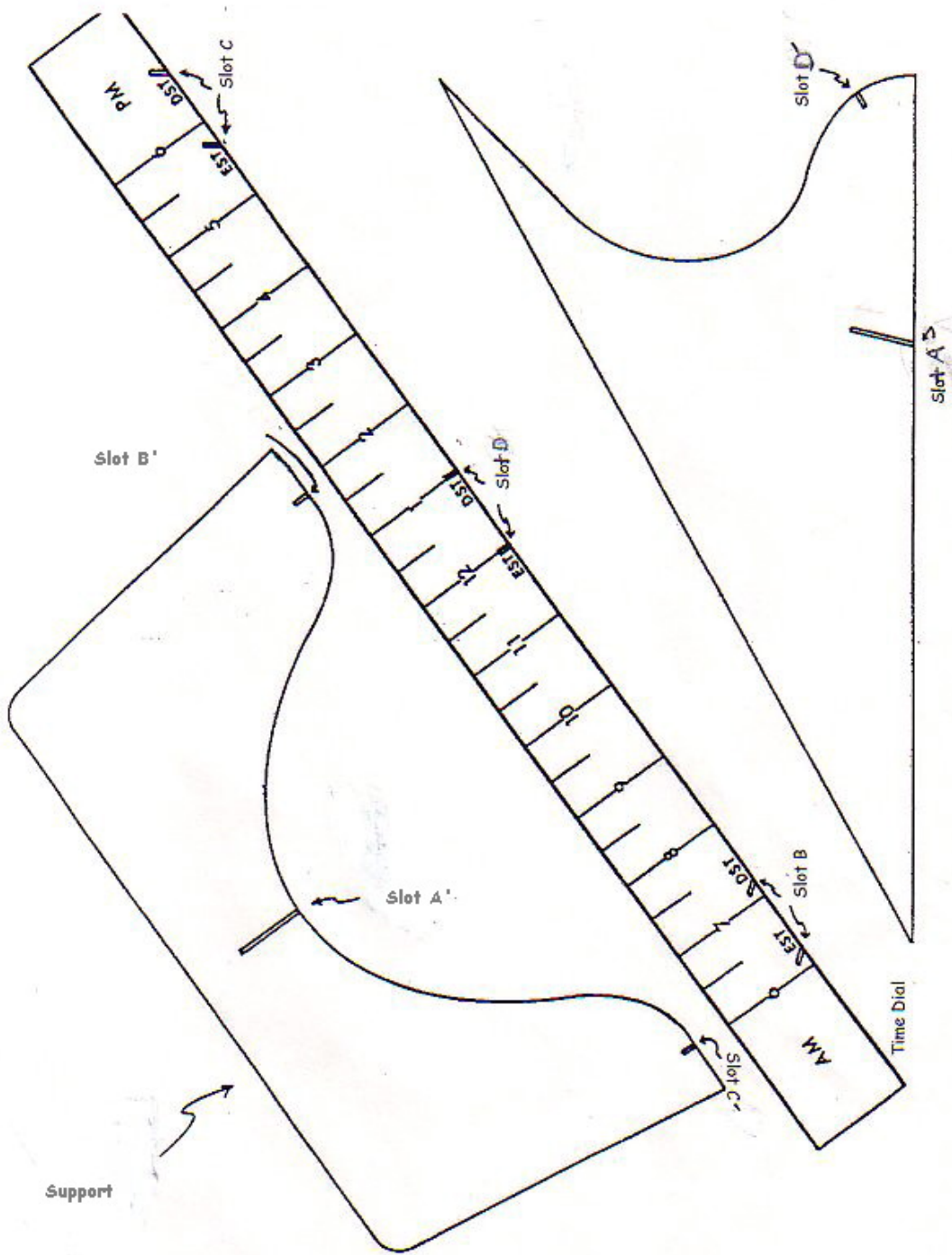


## Procedure to Construct and Use a Sundial to tell Time

1. Glue the page with sundial parts onto the sheet of cardboard or thick construction paper. Give the glue time to dry completely.
2. Using the scissors, cut out the three sundial parts and make a cut where each lettered slot is marked.
3. Gently curve the time dial (the long piece with the times) into the shape of a half circle so that the numbers appear on the inside of the circle.
4. Connect the gnomon (the triangle-shaped part of the sundial that makes the shadow) to the support by sliding slot A into slot A'.
5. Attach the time dial by connecting slot B with slot B'; C with C' and D with D'. If the time of year is Standard Time, which we use from October through April in the continental US, use the slots marked EST. If you are on Daylight Savings Time, which we use from one Saturday in April through one Saturday in October, connect the time dial to the slots marked DST.
6. Take your completed sundial outside. Using a compass, place the sundial on the ground with the gnomon pointed toward the north.
7. The shadow of the gnomon point will cover the current time on the time dial. The sun must be visible in order for the sundial to work.

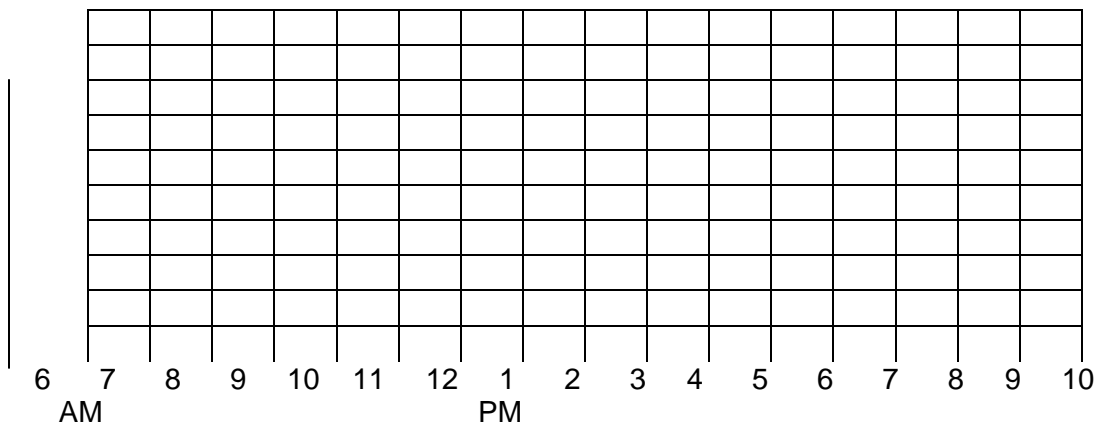




### Procedure to Construct and use an Astrolabe

1. Cut out a rectangular piece of cardboard that is large enough to tape a protractor to.
2. Cut out the paper protractor and glue it to the cardboard.
3. Put a string through the hole at the edge of the protractor. The string should be long enough to be taped to the back of the protractor and hold a small weight, such as a paper clip. (See the diagram on the next page).
4. Tape the string to the back of the cardboard.
5. Attach a small weight (paper clip) to the other end. This end will hang over the degrees of the angle of elevation of the object you are measuring.
6. Tape a drinking straw to the horizontal surface of the protractor, just above the hole where your string is attached.
7. To use your astrolabe, go outside. Point the straw toward the sun. **DO NOT LOOK AT THE SUN.** Line up the straw so that the sun shines through the straw and a bright spot can be seen on a piece of paper or your hand.
8. Read the angle where the string hangs across the protractor.
9. Record the angle of the sun's elevation.
10. At different times throughout the day, use your sundial to check the time and record the angle of the sun with your astrolabe. Plot the angle on the graph below for each hour. Don't forget to label the axes on your graph.

Title: \_\_\_\_\_



You can do this activity throughout the year and record the path of the sun across the sky on different days. You will be able to compare the path of the sun at different seasons.

