

Make the body of the sundial:

1. Use the pin and ruler to score the centerline printed on the front of the paper. (Put the ruler next to the line and run the pin along it as if you were drawing the line.)
2. Fold along the score in both directions so there is a crease you can see on the back, but so that the paper still lays flat.
3. Align the protractor with top edge of the paper, centering the hole over the centerline.
4. Trace around the protractor.
5. Mark center point.
6. Beginning at 0° mark every 15° along the edge of the arc.
7. Connect the center point, 0° and 180° with a line. This is the **baseline** of your sundial.
8. Connect each of the other marks with the center point.
9. Label the marks with the hours. 12 is at 90°, and the hours go clock wise, beginning at 6am on the top right mark. This is the **faceplate** of your sundial.
10. Use the hole punch to make a hole between the base line and edge of the paper as close as possible to the intersection of the baseline and the centerline.

Make the support for the sundial:

1. Find the latitude of your location , rounding to the nearest whole degree. _____ (Label it as degrees.)
2. Subtract the latitude from 90° to find the co-latitude. _____ (Label it as degrees.)
3. Find the tangent of the co-latitude. _____
4. Multiply the tangent by 10, rounding to the nearest tenth. _____ . This is the length, in cm, of side B.
5. Use your ruler to measure and mark that distance on side B.
6. Measure side A to be sure it is exactly 10 cm. (Copying sometimes causes distortion.) Remark the endpoint if needed.
7. Draw the hypotenuse between the marks you made on side A and side B.
8. Check the angles you just created. The one between side A and the hypotenuse should equal the co-latitude and the other should be the latitude. Label each angle with its measurement.
9. Cut out the triangle.

Assemble the sundial:

1. With the faceplate up, lay side A along the center line with the right angle barely touching the baseline below the hole you punched. Mark it's length on the centerline
2. Use your protractor and ruler to draw a line perpendicular to the centerline at that spot.

Compare the time on the sundial to a watch or clock. (Remember to allow for daylight savings time!

3. Use the pushpin to score and fold along that line so the baseplate is facing out. Now your sundial has both a faceplate and a **base**.
4. Lay the paper with the faceplate down. Tape side A of the triangle along the centerline with the 90° angle towards the top and angle of the co-latitude at the intersection of the centerline and the fold perpendicular to it.
5. Tape the hypotenuse to the base along the centerline.
6. Insert the gnomon through the hole and tape it to the triangle so it is far enough above the faceplate to make a shadow.
7. Align your sundial with true north.

Location	Latitude
Albin	41.4°
Basin	44.3°
Casper	42.8°
Cheyenne	41.1°
Cody	44.5°
Denver	39.7°
Ft. Bridger	41.3°
Gillette	44.9°
Green River	41.5°
TSS	43.6°
Laramie	41.3°
Powell	44.7°
Rawlins	41.7°
Saratoga	41.4°
Sheridan	44.7°
Torrington	42.0°

Co-Latitude	Tangent
51°	1.235
50°	1.191
49°	1.150
48°	1.110
47°	1.107
46°	1.035
45°	1.000