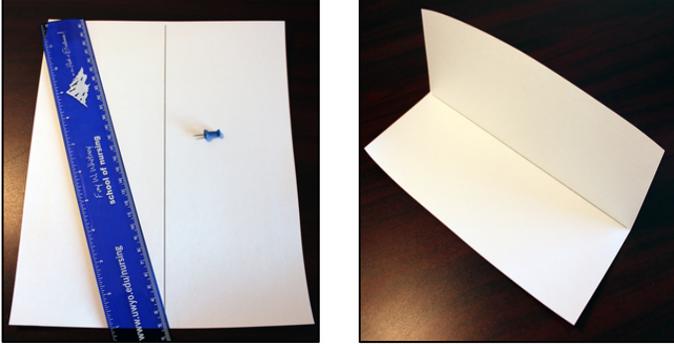


## Make the body of the sundial:

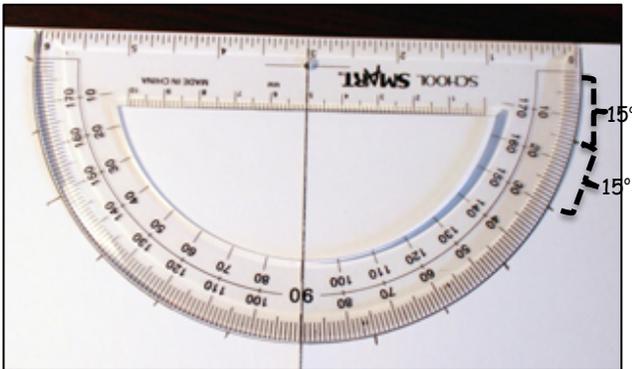
Step 1: Use the pin and ruler to score the centerline printed on the front of the paper.  
Step 2: Fold along the score in both directions so there is a crease you can see on the back, but so that the paper still lays flat.



Step 8: Connect each of the other marks with the center point.

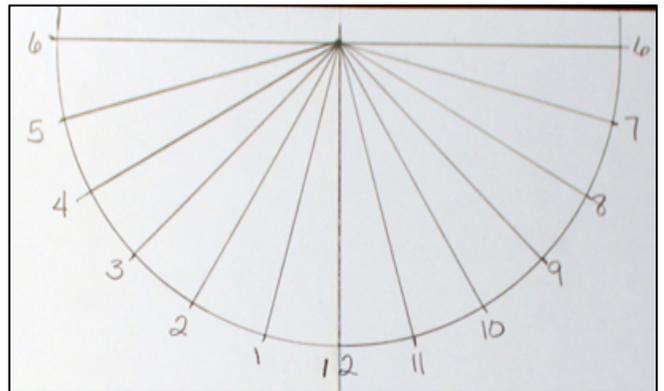


Step 3: Align the protractor with top edge of the paper, centering the hole over the centerline.  
Step 4: Trace around the protractor.



Step 5: Mark center point.  
Step 6: Beginning at 0°, mark every 15° along the edge of the arc.

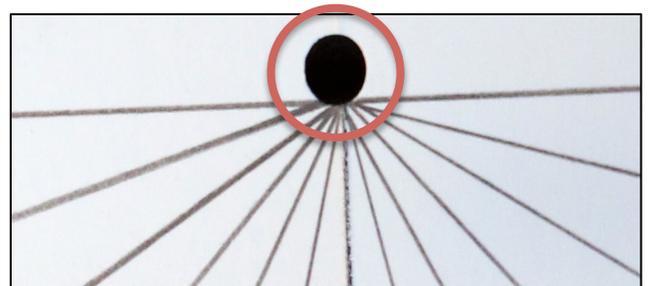
Step 9: Label the marks with the hours. 12 is at 90°, and the hours go clockwise, beginning at 6am on the top right mark. This is the **faceplate** of your sundial.



Step 7: Connect the center point, 0° and 180° with a line. This is the **baseline** of your sundial.



Step 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:

Make the support for the sundial:

1. Find the latitude of your location, rounding to the nearest whole degree. 41°
2. Subtract the latitude from 90° to find the co-latitude. 49°  
(Label it as degrees.)  $90 - 41 = 49$
3. Find the tangent of the co-latitude. 1.150
4. Multiply the tangent by 10, rounding to the nearest tenth. 11.5 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.

(Remember to allow for daylight savings time!)

Location	Latitude in degrees N of the equator
Albin	41.4°
Bain	44.3°
Casper	42.8°
Cheyenne	41.1°
Cody	44.5°
Denver	39.7°
Pt. Bridger	41.3°
Gillette	44.9°
Green River	41.5°
Rock	43.4°
Laramie	41.3°
Rawlins	41.7°
Saratoga	41.4°
Sheridan	44.7°
Torrington	42.0°

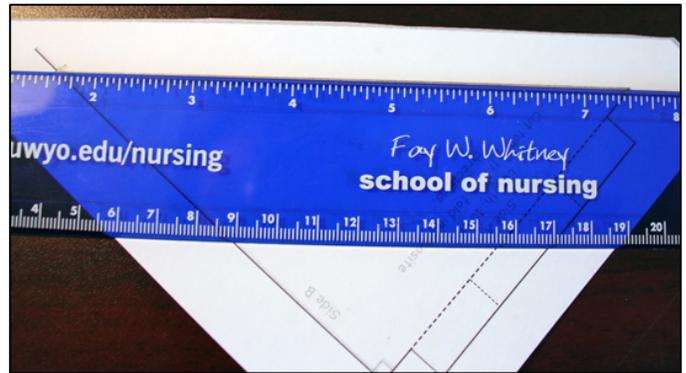
  

Co-Latitude	Tangent
51°	1.235
50°	1.191
49°	1.150
48°	1.110
47°	1.077
46°	1.035
45°	1.000

Assemble the sundial:

1. Put the triangle on the centerline with side A barely below the hole and mark its length on the centerline.
2. Use your protractor and ruler to draw a line perpendicular to the centerline at that spot.
3. Use the pushpin to score and fold along that line so the baseplate

Step 7: Draw the hypotenuse between the marks you made on side A and side B.

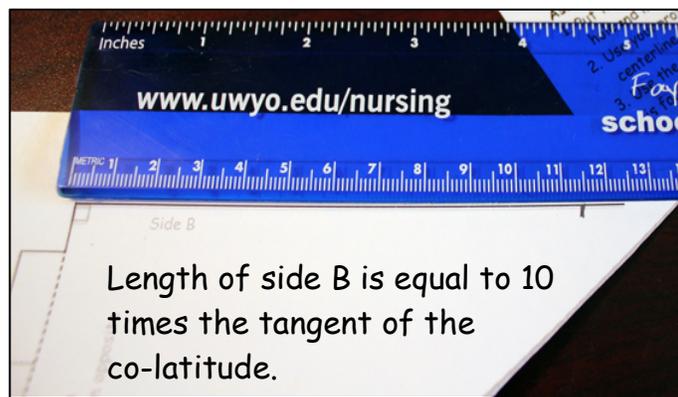


- Step 1: Find the latitude of your location, rounding to the nearest whole degree.
- Step 2: Subtract the latitude from 90° to find the co-latitude.
- Step 3: Find the tangent of the co-latitude.
- Step 4: Multiply the tangent by 10, rounding to the nearest tenth. This is the length, in cm, of side B.

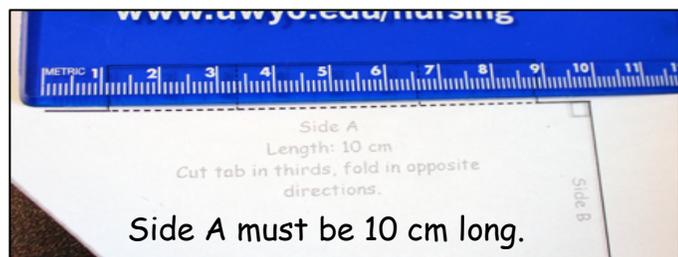
Step 8: Check the angles you just created. The one between side A and the hypotenuse should equal the co-latitude and the other should be the latitude.

Step 9: Label each angle with its measurement.

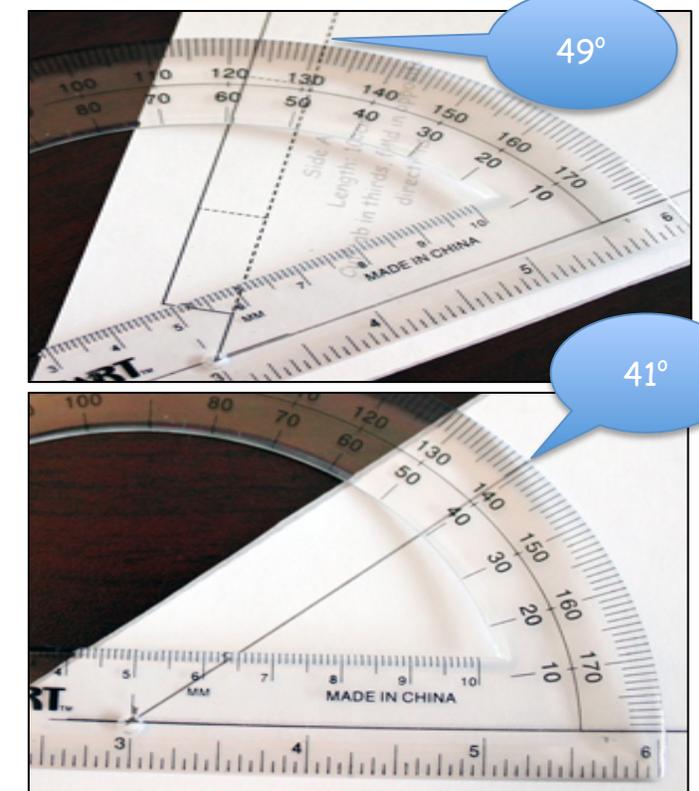
Step 5: Use your ruler to measure and mark that distance on side B.



Step 6: Measure side A to be sure it is exactly 10 cm. Remark the endpoint if needed.



Side A must be 10 cm long. Mark a new endpoint if the printed line is distorted.



Step 10: Cut out the triangle

