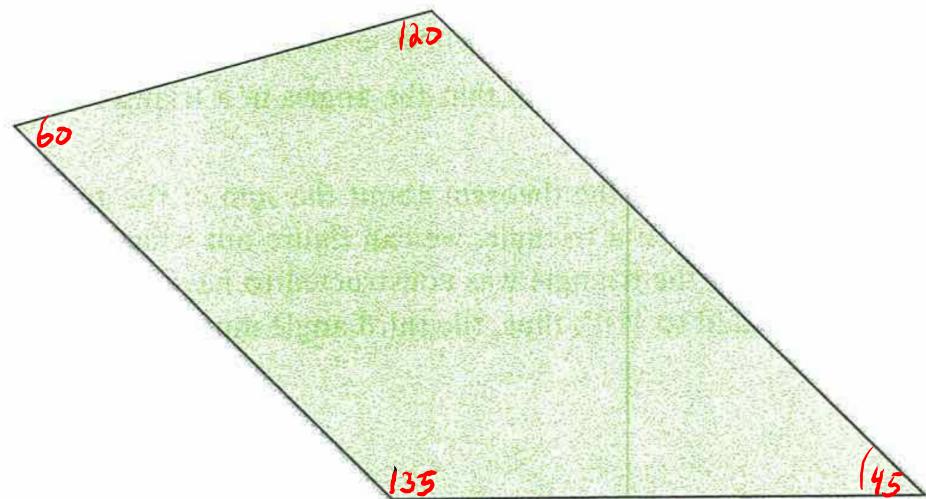
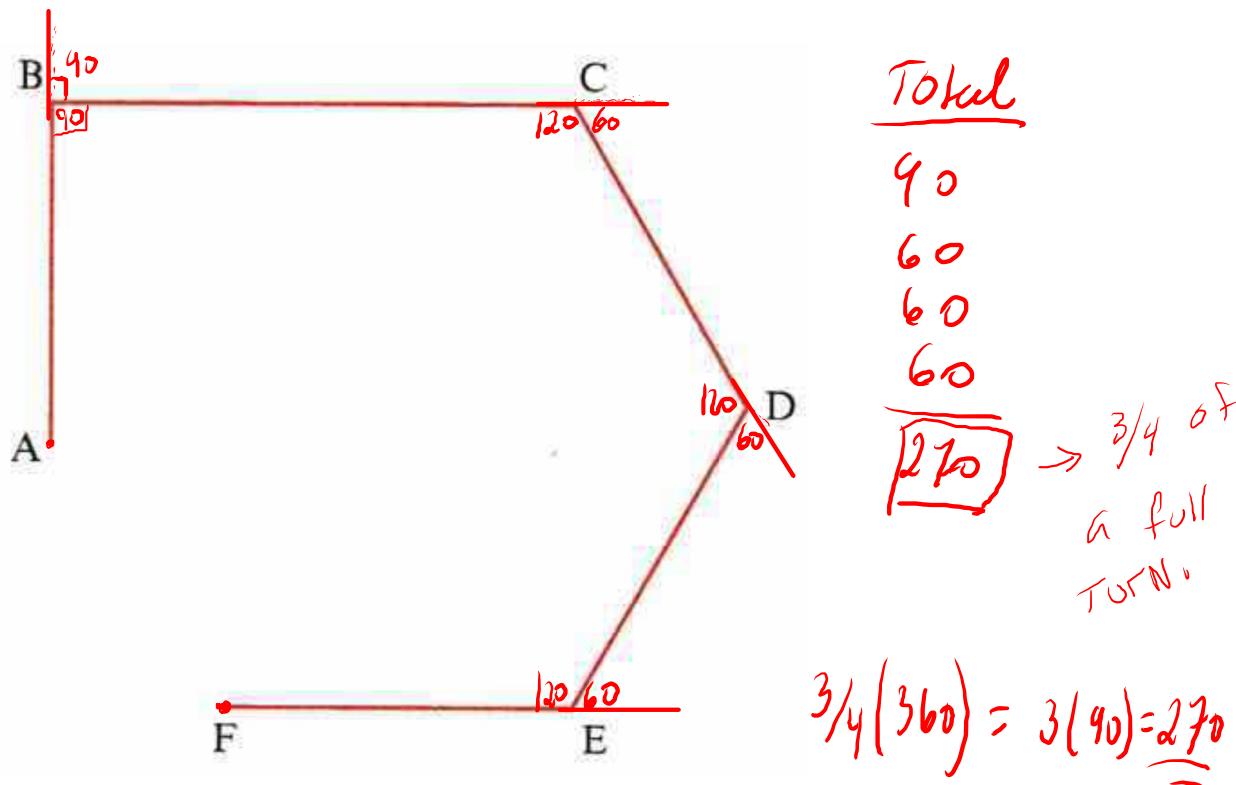


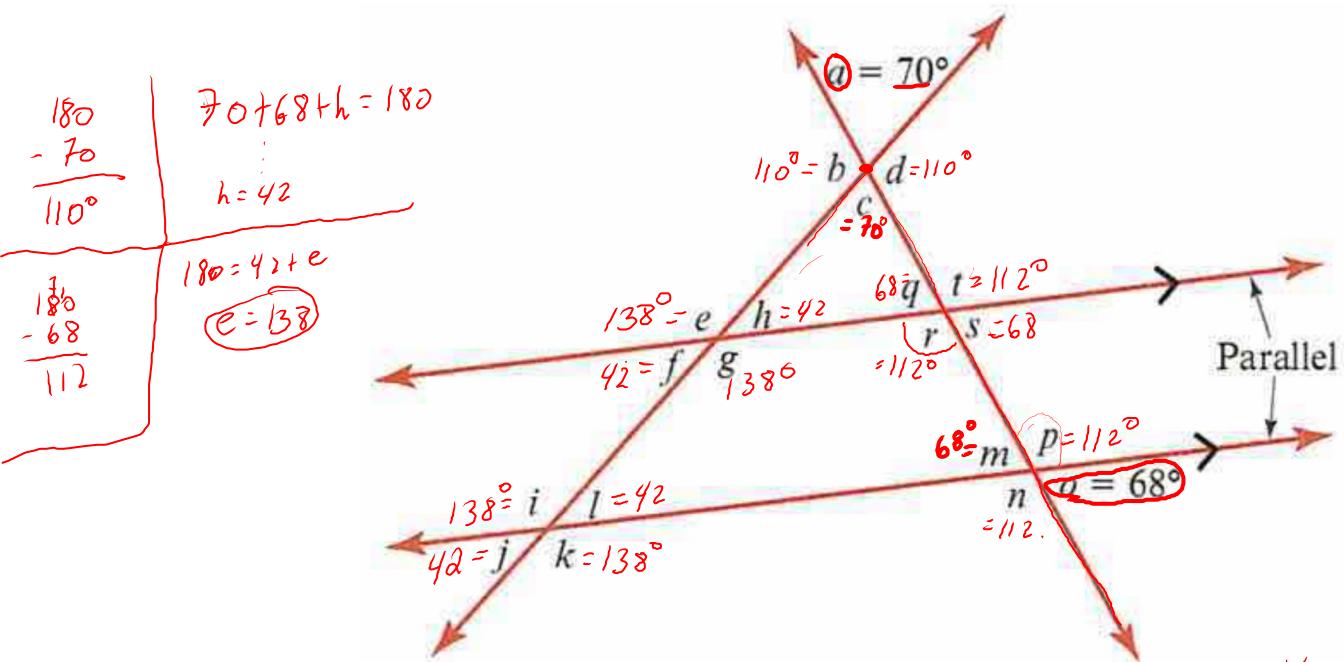
1. Use a protractor to measure the angles formed by the shape below.



2. Dorothy walks from point A to point F along the route indicated on the map below. Show Dorothy's angles of turning along her route. Use a protractor to measure these angles. Then determine Dorothy's total amount of turning in two different ways.



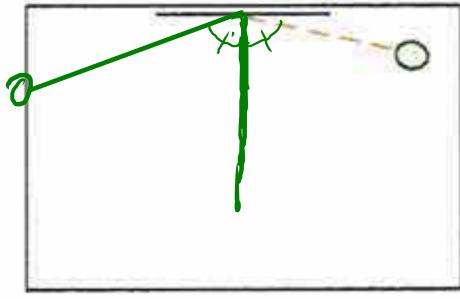
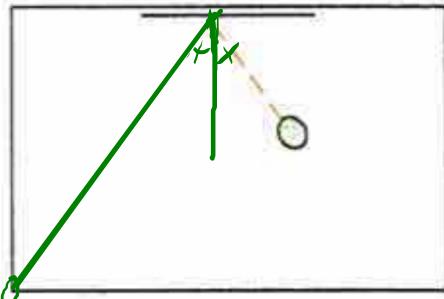
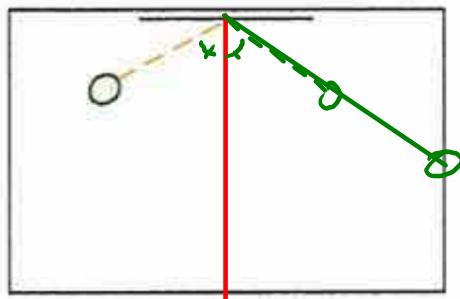
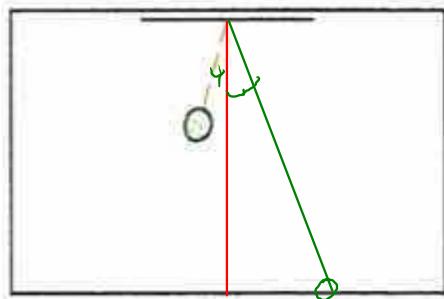
3. Find all the angles. Show your work.



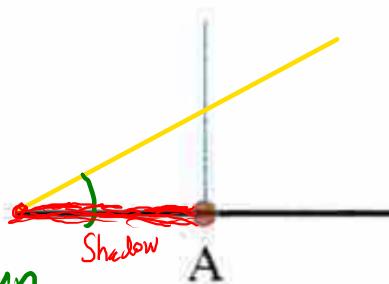
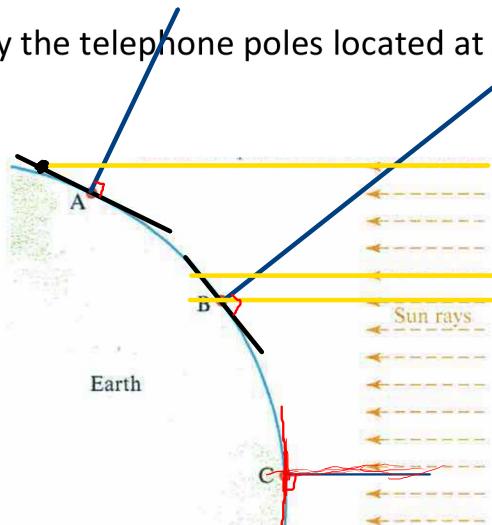
$\angle C = 70$
 $\angle d = 110$
 $\angle b = 110$
 $\angle m = 68$
 $\angle s = 68$
 $\angle q = 68$
 $\angle p = 112$.
 $\angle r = 112$.
 $\angle t = 112$.
 $\angle h = 42$
 $\angle e = 138$
 $\angle g = 138$
 $\angle i = 138$
 $\angle k = 138$.
 $\angle f, \angle l$
 $\angle j, \angle i$.

$\angle r, \angle p$ are interior \angle 's, same for $\angle n, \angle s$.

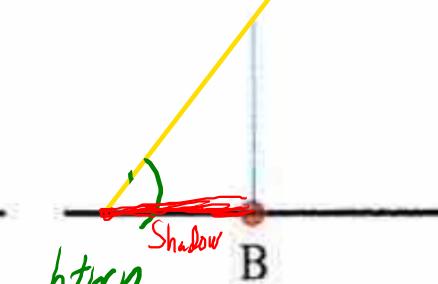
4. The figure below shows several math drawings (from the point of view of a fly looking down from the ceiling) of a person standing in a room, looking into a mirror on the wall. The direction of the person's gaze is indicated with a dashed line. What place in the room will the person see in the mirror?



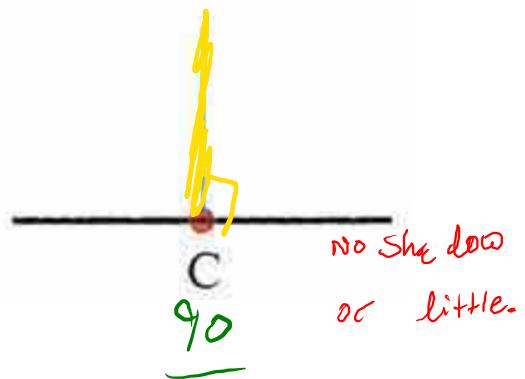
5. Show the shadows produced by the telephone poles located at A, B, and C.



btrn
[$25^\circ, 30^\circ$]



btrn
[$50, 55$]

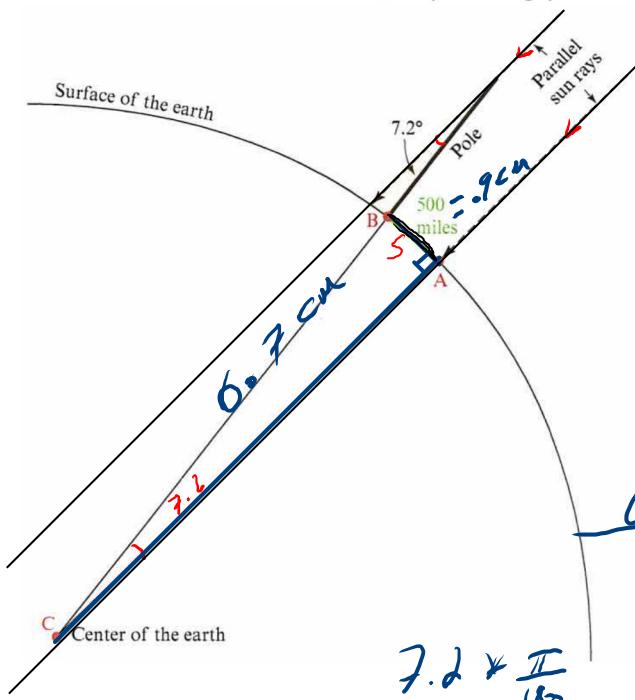


90

No She doo
or little.

6. The figure below shows a cross-section of the earth. At noon on June 21, the sun is directly overhead at location A, so that the sun's rays are perfectly vertical there. At the same time, 500 miles away at location B, the sun's rays make a 72° angle with the tip of a vertical pole (shown not to scale), which was determined by considering the shadow that the pole casts. Because the sun is far away, sun rays at the earth are (approximately) parallel. Use this information to determine the circumference of the earth, explaining your reasoning.

$B = d \times r$



$$C = 2\pi r$$

$$0.9 \text{ cm} = 500 \text{ miles}$$

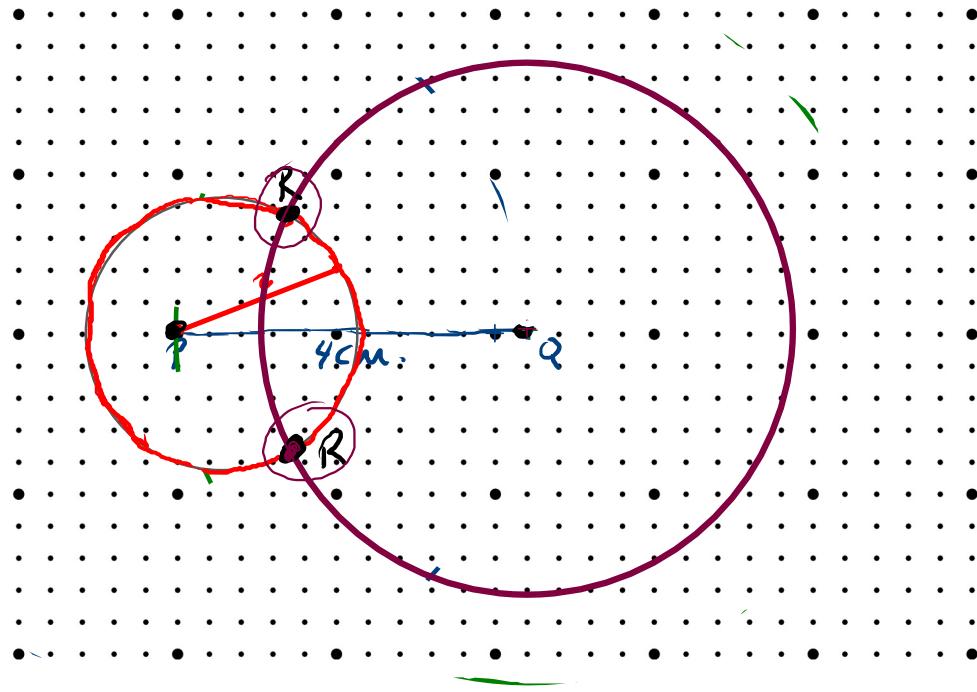
$$6.7 \text{ cm} \times \frac{500 \text{ miles}}{0.9 \text{ cm}} = 3,722.22 \text{ miles}$$

$$C = 2\pi r = 2\pi(3,722.22) = 23,387.41 \text{ miles}$$

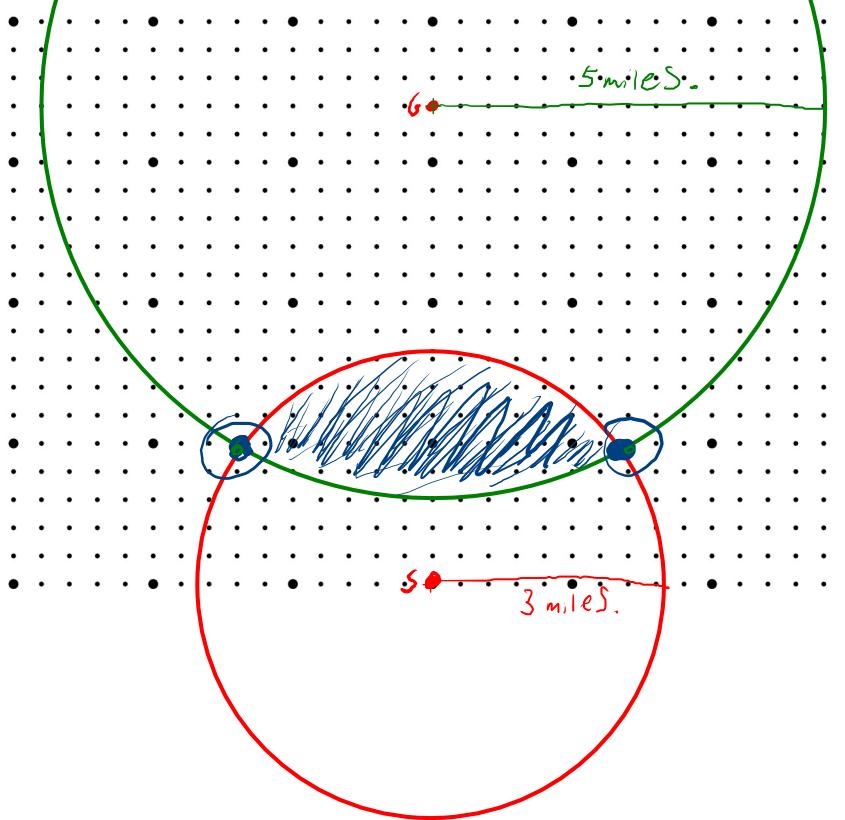
$$\theta = \frac{s}{r} \rightarrow r = \frac{s}{\theta} = \frac{500 \text{ miles}}{7.2 \times \frac{\pi}{180}} = 3978.87 \text{ miles}$$

$$C = 2\pi(3978.87...) = 25,000 \text{ miles}$$

7. Points P and Q are 4 centimeters apart. Point R is 2 cm from P and 3 cm from Q. Use a ruler and a compass to draw a precise picture of how P, Q, and R are located relative to each other.



8. A new mall is to be built to serve the towns of Sunnyvale and Gloomington, whose centers are 6 miles apart. The developers want to locate the mall not more than 3 miles from the center of Sunnyvale and also not more than 5 miles from the center of Gloomington. Draw a simple map showing Sunnyvale, Gloomington, and all potential locations for the new mall, based on the given information. Be sure to show the scale of your map. Explain how you determined the possible locations for the mall.

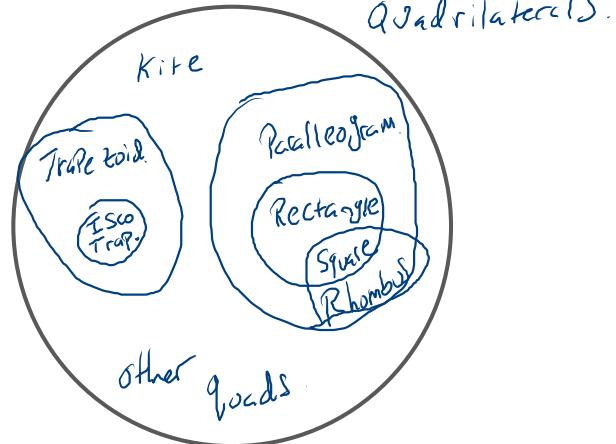
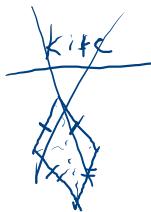


* Since the mall has to be within 3 miles and 5 miles of Sunnyvale and Gloomington, respectively, the possible locations are btwn the circles when they overlap.

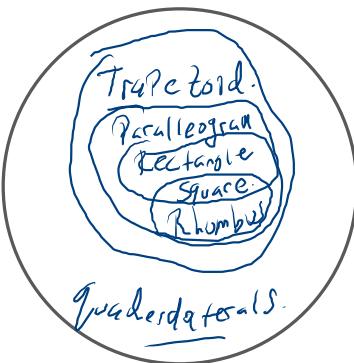
9. Draw a Venn diagram that shows the relationships among the categories of quadrilaterals, squares, rectangles, parallelograms, rhombuses, and trapezoids. Explain briefly.

Can be solved with the following definition:

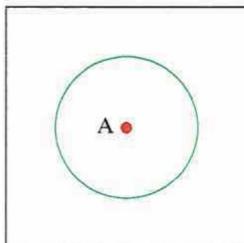
① Trapezoid has one pair of parallel lines.



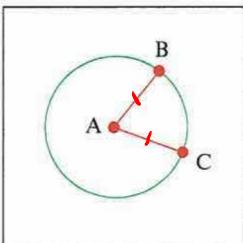
② Trapezoid has at least one pair of parallel lines.



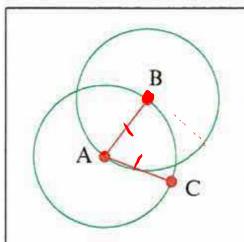
10. Use the definition of circles and rhombuses to explain why the quadrilateral A B D C produced by the method below must necessarily be a rhombus: All sides are equal.



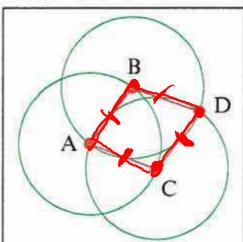
Step 1: Starting with any point A, draw a circle with center A.



Step 2: Let B and C be any two points on the circle that are not opposite each other. Draw line segments AB and AC.



Step 3: Draw a circle centered at B and passing through A.



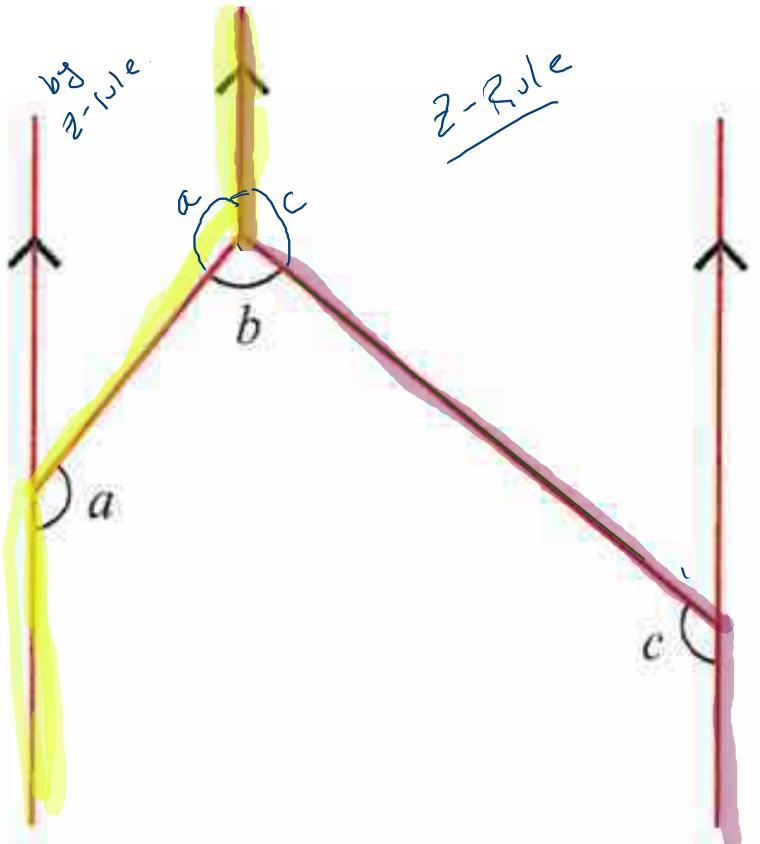
Step 4: Draw a circle centered at C and passing through A. Label the point other than A where these last two circles meet D. Draw line segments BD and CD.

Step 2: $AB = AC$ Since all radii from same center are equal,

From Step 4: $CA = CD$ } $AC = DC$
and $BA = BD$ } $AB = DB$.
 $AB = AC$.

$BD = BA = AB = AC = CA = CD \Rightarrow$ The + all sides
the same side
So $AB = BD = DC = CA$, hence quad ABCD
is a Rhombus.

11. Given that the lines in the figure below marked with arrows are parallel, determine the sum of the angles $a + b + c$ without measuring. Explain your reasoning.

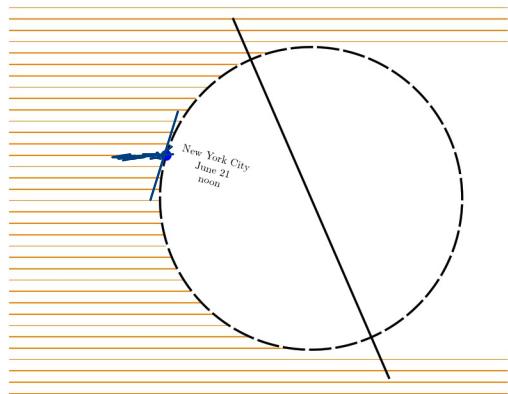


$$a + b + c = 360$$

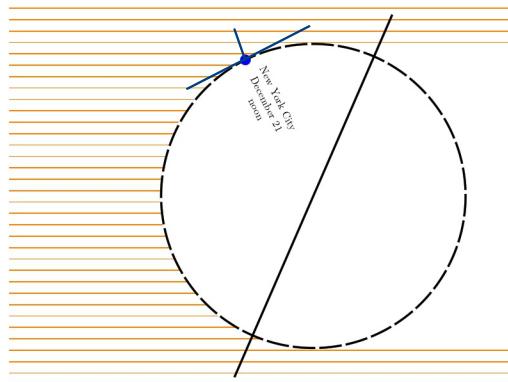
Since we are going
in a full Rotation.

* a is located left of $\angle b$
by "Z-Rule", and same for $\angle c$
except to the right of $\angle b$.

12. Use the diagrams below to explain why the weather is warmer in summer than in winter.



Sunrays are more direct on NYC
i.e. they're more \perp to NYC.



* Sun rays are not as direct in the winter since it's not as \perp .