**Activity 5.2.5a Locating the Center of a Circle**

**Materials needed:** Centimeter ruler and compass

Recall **The Perpendicular Bisector of a Chord Theorem**: The perpendicular bisector of any chord of a circle passes through the center.

1. Mr. Smiley believes every happy-face needs a nose in the center. He wants you to put an X for a nose in the center of the circle below. Help him by following the directions below.

![C:\Users\Math\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\TBUPBSG5\smiley_face[1].jpg]()

1. Using a straightedge, lightly draw a chord on the circle. Label the endpoints *A* and *B*
2. Lightly draw the perpendicular bisector of the chord $\left( \overbar{AB} \right)$

*(According to the perpendicular bisector of a chord theorem, this line passes through the center however you don’t know exactly where on this line is the center of the circle.)*

1. Lightly draw a second chord that is not parallel to the first. Label the endpoints *C* & *D*.
2. Lightly draw the perpendicular bisector of this chord $\left( \overbar{CD} \right)$.

*(According to the perpendicular bisector of a chord theorem, this line passes through the center of the circle as well!)*

1. The center of the circle is the intersection of the perpendicular bisectors. Put an **X** for the nose!
2. Explain the relationship between $\overbar{XA}, \overbar{XB}, \overbar{XC}, and \overbar{XD}$.
3. Why do the chords $\left(\overbar{AB} and \overbar{CD}\right)$ have to be nonparallel segments?
4. Every time a student gets an A on a test, Mr. Smiley draws a happy face on their paper. There are so many students with good grades that his pen ran out of ink after drawing the arc below! Help him draw a perfect circle
5. How can you find the center of the circle that he started to draw?
6. Once you know the center of the circle, how can you draw the rest of the circle?
7. Use your answers from questions 4a and 4b to extend the arc below into a completed circle. *If you made the circle properly, then draw a smiley face in the circle!*
8. Explain why the intersection of the two perpendicular bisectors of two nonparallel chords is always the center of the circle
9. An archaeologist digs up a piece of a circular ceramic plate. She wants to find the original diameter of the broken plate. How can she do this?

To the nearest tenth of a centimeter, what is the diameter of this plate?



1. “The Circle of Rafaim” in Israel is one of the most mysterious sites in the world. The monument consists of 5 concentric stone rings that weight a total of 37,000 tons. Despite the obvious attraction to archaeologists, the rings remained hidden while the suspicious Syrian regimes owned the land and were only opened to inspection after Israel won the area in the Six Day War of 1967. (<http://mysteryoftheiniquity.com/>)

	1. On the picture below, find the center of the outermost ring.
	2. In this picture below, draw and measure the diameter in cm.
	3. Using the scale 1cm = 10 meters, what is the approximate diameter of the actual stone rings?

