Chords and Circles

ChordsAndCircles.tns

Name ________________________

Class ________________________

Problem 1 – Relationship between a chord an its perpendicular bisector

Circle *A* is shown on page 1.3. $\overline{BC}$ is a chord of the circle, and point *D* is the midpoint of $\overline{BC}$. The perpendicular bisector of $\overline{BC}$ is also shown. Drag point *B* around the circle.

1. What is true about the perpendicular bisector of $\overline{BC}$?

Hide the perpendicular bisector, $\overleftrightarrow{AD}$, and use the **Segment** tool to draw $\overline{AD}$. Then use the **Length** tool to display the lengths of $\overline{BC}$ and $\overline{AD}$. Double click on each text box and enter a label for the measurement. Drag point *B* around the circle.

2. How does the length of $\overline{BC}$ relate to that of $\overline{AD}$?

3. What happens to $\overline{BC}$ when point *D* coincides with point *A* (i.e., when *AD* = 0)?

On page 1.7, the length of $\overline{BC}$ has been transferred to the *x*-axis and the length of $\overline{AD}$ has been transferred to the *y*-axis.

Construct perpendicular lines to the *x*- and *y*-axes through their respective points. Change the **Attributes** of the lines so they appear dotted, and mark their intersection as point G.

Watch the path of point *G* as you drag point *B* around the circle. Then use the **Locus** tool to display this path. Label point *G* with its coordinates using the **Coordinates and Equations** tool.

4. What is true about $\overline{BC}$ and $\overline{AD}$ when *G* coincides with the *y*-intercept of the locus? With the *x*-intercept?

5. As point *G* moves from left to right, what happens to its *y*-coordinate?

6. What does this mean in terms of $\overline{BC}$?

Problem 2 – Investigating congruent chords

On page 2.2, draw a second chord of circle *A*, $\overline{HJ}$. Then construct a segment from *A* to the midpoint, *K*, of $\overline{HJ}$. Measure the lengths of $\overline{HJ}$ and $\overline{AK}$. Drag *H* or *J* around the circle, and try to make the lengths of $\overline{HJ}$ and $\overline{BC}$ equal.

7. What is the relationship between congruent chords of a circle and their respective distances from the center of the circle?

Problem 3 – Extension

A diagram similar to the one on page 1.7 may be found on page 3.2. Measure the radius of the circle and store itas the variable **rad**. Write and graph the equation, in terms of **rad**, of an ellipse that matches the locus.

