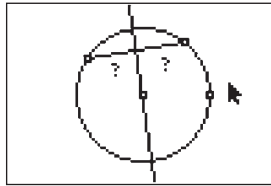# Perpendicular Segments in a Circle

Approximate Total Time: 20 minutes

ACTIVITY OVERVIEW:

In this activity we will

- Draw a circle
- Draw a chord
- Draw a line perpendicular to the chord and passing through the center of the circle
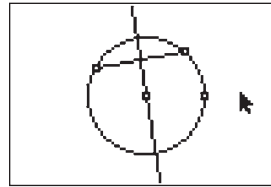- Explore the lengths of the two segments of the chord

What is a chord of a circle? What happens if you draw a line perpendicular to the chord and through the center of the circle? Will the same thing happen with a different chord? What if you change the size of the circle?

NCTM Geometry Standard: Analyze characteristics and properties of 2- and 3-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
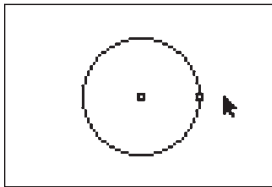

1

Press APPS. Move down to the CabriJr APP and press ENTER. Press ENTER, or any key, to begin using the application.

Press Y= for the F1 menu and select **New**. (If asked to **Save changes?** press ◄ ENTER to choose "No.")

2

Press WINDOW for F2, move down to **Circle** and press ENTER. Move to the desired location of the center and press ENTER. Move to indicate the length of the radius and press ENTER. Press CLEAR to turn off the **Circle** tool.

3

Press WINDOW for F2, move to **Segment** and press ENTER. Move the pencil until the circle is flashing and press ENTER to mark one endpoint of a chord. Move the pencil until the circle is again flashing and press ENTER to mark the other endpoint of the chord. Press CLEAR to deactivate the **Segment** tool.
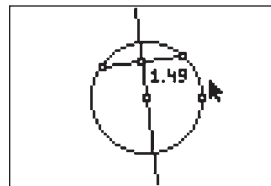

4

Press ZOOM for the F3 menu, move to **Perp.** and press ENTER. Move the pointer until the chord is flashing and press ENTER. Move the pencil until the center of the circle is flashing and press ENTER. This will draw a line perpendicular to the chord and through the center. Press CLEAR to deactivate the **Perp.** tool. What appears to be true about the two parts of the chord?
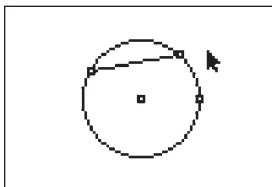

5

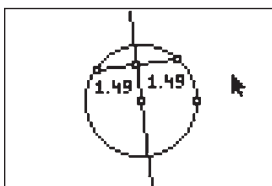The perpendicular line appears to have bisected the chord. To test this, we will measure the segments.

Press GRAPH for the F5 menu to measure the lengths of the two segments of the chord. Move down to **Measure** and right to **D & Length**. Press ENTER. Move the pencil until one endpoint of the chord is flashing. Press ENTER. Move the pencil until the chord and the perpendicular line are flashing and press ENTER. This displays the segment length and marks the intersection of the chord and the perpendicular line. Press + to see the measurement rounded to hundredths. Move the measurement to a convenient location. Press CLEAR to turn off the *hand*.

6

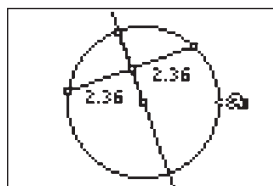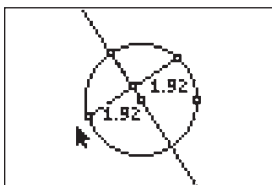With the measurement tool still active, find the length of the other segment of the chord. Move until the point of intersection of the chord and the perpendicular line is flashing, then press ENTER. Move until the other endpoint of the chord is flashing and press ENTER. Press + to display the measure rounded to hundredths. Move the measurement to a convenient location and press CLEAR to deactivate the *hand*. Press CLEAR to exit the measurement tool.

7

It appears that a line which is perpendicular to a chord and passes through the center of a circle also bisects the chord. Test this conjecture by changing the length or location of the chord. Move the pointer until one endpoint of the chord is flashing. Press ALPHA and move the point to a different location. Observe the changes in the segment measures as the chord is moved. You can explore this further by changing the size of the circle.
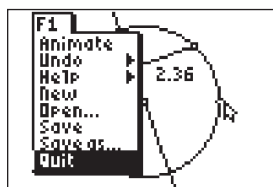

8

Since the line perpendicular to the chord passes through the circle's center, it contains a diameter and a radius which are also perpendicular to the chord. This illustrates part of the familiar theorem: In a circle, if a diameter or radius is perpendicular to a chord, then it bisects the chord (and its arc).

9

To exit the APP, press Y= for the F1 menu. Move to **Quit**, then press ENTER. (Or you can press 2nd MODE for [QUIT].)