**Activity 5.2.3 Chords and Perpendicular Bisectors in a Circle**

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| **Definitions**   * A **chord** of a circle is a geometric line segment whose endpoints both lie on the circle. *Not all chords are the same length* * A **diameter** of a circle is any chord that passes through the center of the circle. *All diameters in the same circle are equal in length.* * The **radius** of the circle is a line segment in which one endpoint is the center of the circle and the other endpoint is on the circle. *All radii of the same circle are equal in length*. |

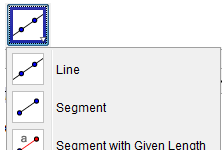
**PART 1: The perpendicular bisector of any chord of a circle**

1. ***Open a new Geogebra document***
2. ***Draw a circle***

* Press the “Circle with Center through Point” icon. 

1. ***Draw a chord***

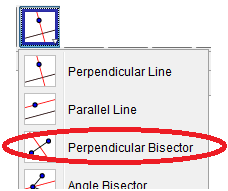
* Press the down arrow of the “Line” icon. 
* Click on the “segment” option.



* Click on any two point on the circle to draw a chord.

1. ***Draw the perpendicular bisector of the chord.***

* Press the down-arrow button on the bottom right of the “Perpendicular Line” icon. 
* Click on the “Perpendicualar Bisector” option



* Click on the chord you just drew

1. ***Draw another chord and a perpendicular bisector of the new chord***

* Follow the directions from steps 3 and 4.

1. ***What did you notice?***

* Drag the center of the circle
* Drag endpoints of the chords
* The perpendicular bisector of any chord in a circle passes through the \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

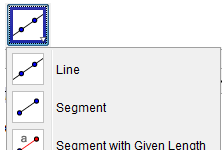
**PART 2: A line passing through the center and perpendicular to a chord**

1. ***Open a new Geogebra window***
2. ***Draw a circle***

* Press the “Circle with Center through Point” icon. 

1. ***Draw a chord***

* Press the down arrow of the “Line” icon. 
* Click on the “segment” option.



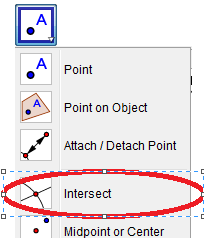
* Click on any two point on the circle to draw a chord.

1. ***Draw a line perpendicular to the chord that passes though the center of the circle.***

* Press the “Perpendicular Line” icon. 
* Click on the chord and then
* Click on the center of the circle.

1. ***Plot a point at the intersection of the chord and perpendicular line.***

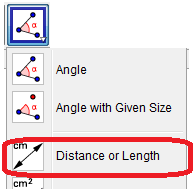
* Press the down-arrow button on the Point icon*.* 
* Click on the “Intersect” option



* Click once on the chord and once on the perpendicular bisector.

1. ***Measure the length from the endpoints of the chord to the intersection***

* Find the length of the radius by clicking the down-arrow of the Angle button 
* Select “Distance or Length” button



* Click on the intersection point and then on one endpoint of the chord
* Click on the intersection point again and then on the other endpoint of the chord.

1. ***What did you notice?***

* Drag the center of the circle
* Drag endpoints of the chords
* A line that passes through the center of a circle and is perpendicular to a chord… \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PART 3: If two chords are congruent**

Visit the website: <http://www.geogebra.org/student/m33124>

You can change the lengths of chords and by dragging either endpoint. Observe the effect on the distance from *A* to the midpoint of each chord.

1. What relationship do you observe as the length of a chord increases? How about when the chord length decreases?

2. What is observed when the chords are congruent?