

Chords in a Circle

Description: Students explore the properties of chords in a circle. They construct a chord and its perpendicular bisector and discover a relationship between the chord's length and its distance to the center of the circle, and they investigate and write a conjecture about congruent chords in a circle.

Technology Strength: By constructing a dynamic chord on a circle and its perpendicular bisector, students can easily explore the properties of chords in a circle. Then, by using a locus, students can investigate the relationship between the chord's length and its distance to the center of a circle.

Objectives: Construct a chord and its perpendicular bisector; examine the relationship between a chord's length and its distance to the center of the circle; write a conjecture about congruent chords in a circle

Prerequisites: Understanding of the terms arc, perpendicular bisector, and congruent; experience interpreting graphs

Suggested Grade Level: 9 to 10

Sketchpad Level: Intermediate

Suggested Duration: 45 minutes. To shorten the time needed, you can stop after Q2; or, if you want students write the conjecture in Q4, skip the graphing section and jump directly from Q2 to Step 15.

Suggested Classroom Setting: Whole Class, Student Pairs. This activity, designed for use by student pairs, can be easily modified for whole-class use.

Preparation: Review the Activity Notes. Work through the steps on the worksheet and make a copy of the worksheet for each student. See the presentation sketch for an example of completed student work.

Materials: None

Student Worksheet(s): Chords in a Circle

Student Sketch: None

Presentation Sketch: Chords Work.gsp

Vocabulary: Circle, chord, midpoint, perpendicular bisector, arc, locus

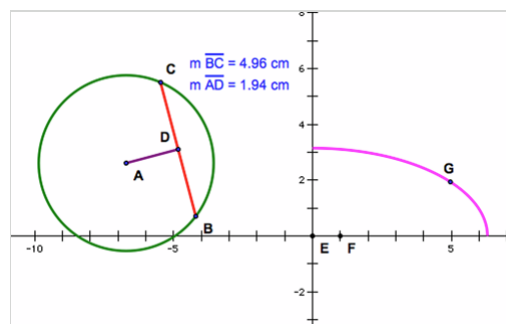
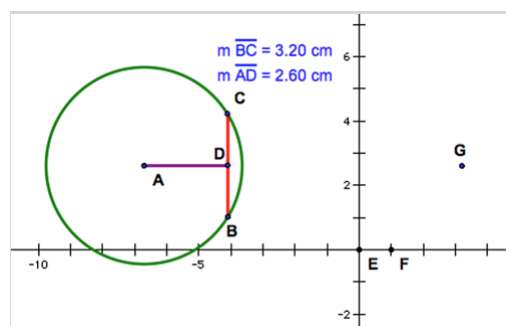
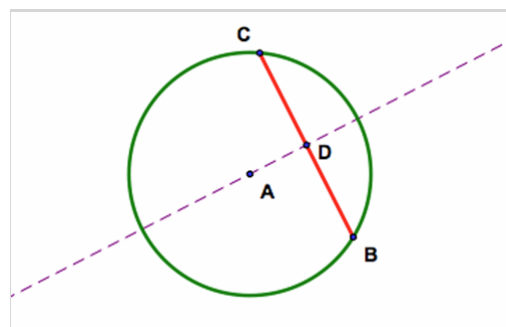
Sketchpad Version: GSP5

Using the Sketch:

Students construct a circle AB , a chord BC on the circle, and the midpoint of the chord, labeled D . They construct the perpendicular bisector of the chord, drag point C around the circle, and use their observations to write a conjecture about the perpendicular bisector of any chord in a circle.

Next, students investigate the relationship between the chord's length and its distance to the center of a circle. They calculate both measurements, use these measurements to plot a point in the coordinate plane, and then construct the locus of this point as point C moves around the circle. Students drag point A , B , or C , to observe how this affects the locus.

Finally, students construct another chord, labeled HI , and use this chord to investigate the relationship between the chord's length and its distance to the center of a circle when two chords are the same length. Using their discoveries, students write a conjecture about congruent chords in a circle.



Sketch Tips:

Sketch Tips show skills needed in this activity, and the step at which the skill is first used.

Sketch Tip	Tip Sheet or Tip Video
Step 3: Construct a midpoint using Construct Midpoint	Constructing Points
Step 4: Construct a perpendicular line using Construct Perpendicular Line	Constructing Parallels and Perpendiculars
Step 6: Hide an object using Display Hide	Deleting and Hiding
Step 8: Measure the length of a segment using Measure Length	Measuring Length and Distance
Step 10: Plot a point by selecting two values and using Graph Plot as (x,y)	Plotting Points
Step 12: Construct a locus using Construct Locus	Constructing a Locus
Step 17: Measure a distance using Measure Distance	Measuring Length and Distance