

Name:

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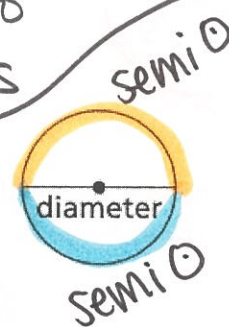
Period: 3

Chords of Circles

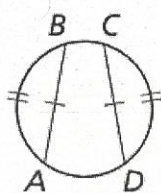
Lesson Objective INBAT use chords of $\odot$ s to find lengths and arc measures

Remember that a chord is a segment with endpoints on the circle.

Because the endpoints lie on the circle, any chord will divide the circle into two arcs:

**Congruent Corresponding Chords Theorem**

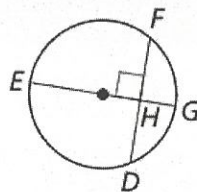
In the same circle, or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.



$\widehat{AB} \cong \widehat{CD}$
if and only if
 $\overline{AB} \cong \overline{CD}$

Perpendicular Chord Bisector Theorem

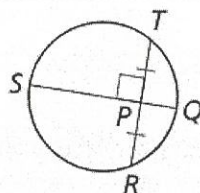
If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord and its arc.



$\overline{EG} \perp \overline{FH} \rightarrow$ ① $\overline{EG}$ bisects $\overline{FH}$
② $\overline{EG}$ bisects $\widehat{FH}$

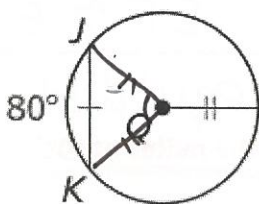
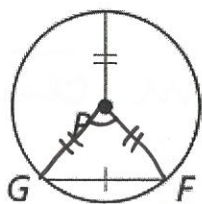
Perpendicular Chord Bisector Converse

If one chord of a circle is a perpendicular bisector of another chord, then the first chord is a diameter.



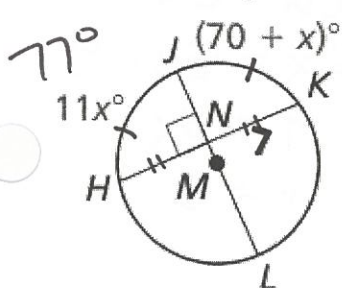
Example:

1. In the diagram, $\odot P \cong \odot Q$, $\overline{FG} \cong \overline{JK}$ and $m\widehat{JK} = 80^\circ$. Find $m\widehat{FG}$.



$m\widehat{FG} = 80^\circ$
by $\cong$ corresp.
chords Thm

2. Given the diagram... 77°



- a. Find HK

$$\boxed{HK = 14}$$

* $HN = 7$ by
 $\perp$ chord bisector
Thm

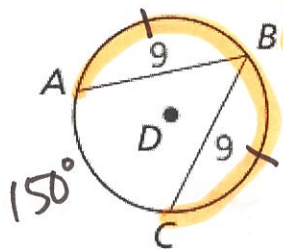
- b. Find $m\widehat{HK} = \boxed{154^\circ}$

$$11x = 70 + x$$

$$10x = 70$$

$$x = 7$$

3. Given the diagram...



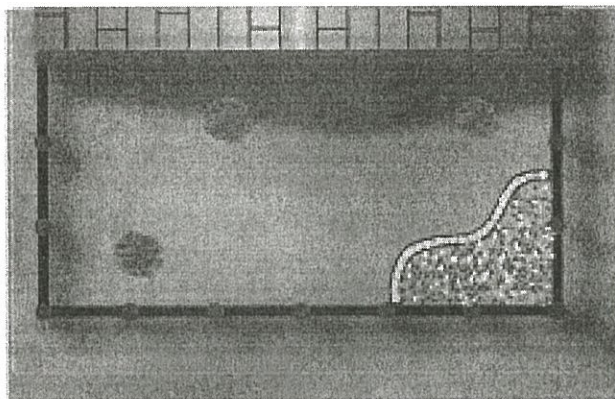
a. If $m\widehat{AB} = 110^\circ$, what is $m\widehat{BC}$?

$$110^\circ$$

b. If $m\widehat{AC} = 150^\circ$, what is $m\widehat{AB}$?

$$\frac{210}{2} = \boxed{105^\circ}$$

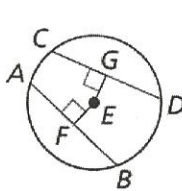
4. Three bushes are arranged in a garden, as shown. Where should you place a sprinkler so that it is the same distance to each bush? (**Construction #3: A circle through three non-collinear points**)



1. Label the bushes A, B, and C. Then draw segments $\overline{AB}$ and $\overline{BC}$.
2. Draw the perpendicular bisectors of each segment from step #1.
→ By the Perpendicular Chord Bisector Converse, these lie on diameters of the circle containing A, B, and C.
3. Find the point where the perpendicular bisectors from step #2 intersect. Label this point.
5. Draw the circle whose center is the point from step #3 and goes through points A, B, and C.

Equidistant Chords Theorem

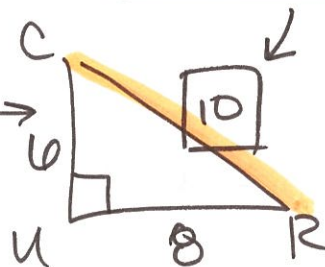
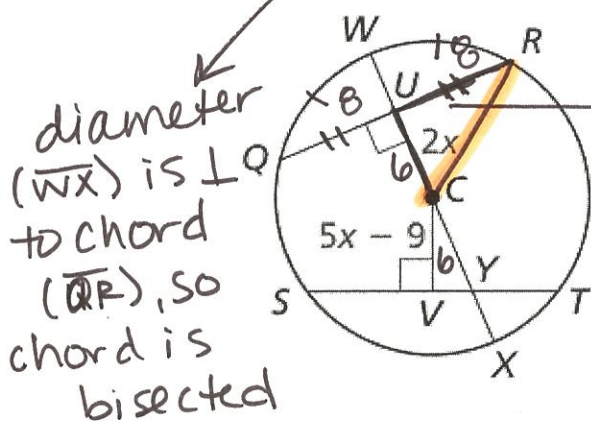
In the same circle, or in congruent circles, two chords are congruent if and only if they are equidistant from the center.



$\overline{AB} \cong \overline{CD}$
if and only if
 $\overline{EF} \cong \overline{EG}$

Example

5. In the diagram, $QR = ST = 16$, $CU = 2x$, and $CV = 5x - 9$. Find the radius of $\odot C$.



$$\begin{aligned} CU &= CV \\ 2x &= 5x - 9 \\ 9 &= 3x \\ x &= 3 \end{aligned}$$