Name ______________________ Date ____________

LESSON 10.3

Study Guide

For use with pages 664–670

GOAL **Use relationships of arcs and chords in a circle.**

Vocabulary

A **chord** is a segment with endpoints on a circle.

Theorem 10.3: In the same circle, or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.

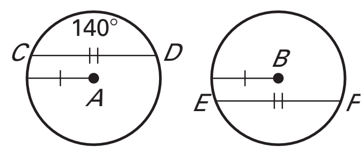
Theorem 10.4: If one chord is a perpendicular bisector of another chord, then the first chord is a diameter.

Theorem 10.5: If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord and its arc.

Theorem 10.6: In the same circle, or in congruent circles, two chords are congruent if and only if they are equidistant from the center.

EXAMPLE 1 Use congruent chords to find an arc measure

In the diagram, $\odot A \cong \odot B$, $\overline{CD} \cong \overline{EF}$ and $m\widehat{CD} = 140°$. Find $m\widehat{EF}$.

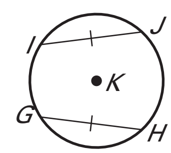


Solution

Because $\overline{CD}$ and $\overline{EF}$ are congruent chords in congruent circles, the corresponding minor arcs $\widehat{CD}$ and $\widehat{EF}$ are congruent. So, $m\widehat{CD} = m\widehat{EF} = 140°$.

Exercises for Example 1

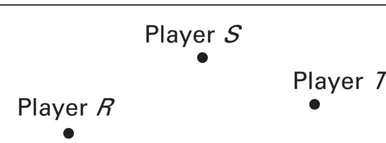
Use the diagram of $\odot K$.



1. If $m\widehat{GH} = 100°$, find $m\widehat{IJ}$.
2. If $m\widehat{GI} = 55°$ and $m\widehat{HJ} = 115°$, find $m\widehat{GH}$.
3. If $m\widehat{IJ} = 85°$ and $m\widehat{HJ} = 120°$, find $m\widehat{GI}$.

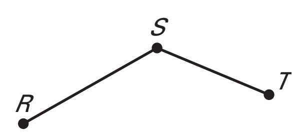
EXAMPLE 2 Use perpendicular bisectors

Three baseball players stand in a field as shown. Where should a fourth player, Player *X*, stand if he wanted to throw the ball the same distance to each player?



Solution

STEP 1 Draw segments $\overline{RS}$ and $\overline{ST}$ as shown.



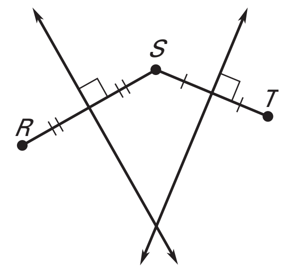
Name ______________________ Date ____________

LESSON 10.3

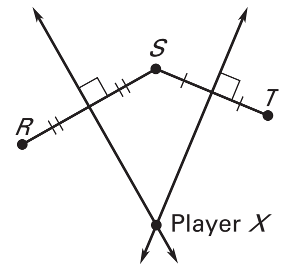
Study Guide *continued*

For use with pages 664–670

STEP 2 Draw the perpendicular bisectors of $\overline{RS}$ and $\overline{ST}$. By Theorem 10.4, these are diameters of the circle containing R, S, and T.

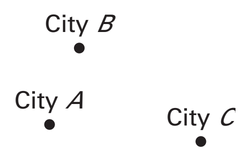


STEP 3 Find the point where these bisectors intersect. This is the center of the circle containing points R, S, and T, so it is equidistant from each point. This is where Player X should stand.



Exercise for Example 2

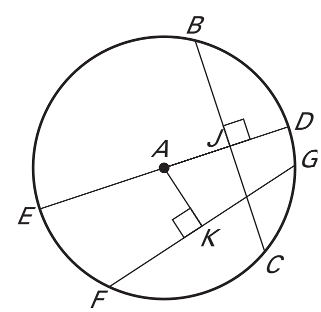
4. Three cities are located on a map as shown. A wireless communications company plans to build a relay tower to provide cell phone service to each of the cities. In order to provide the cities with a signal of equal strength, the tower must be placed equidistant from each. Show and explain how this location can be determined.



EXAMPLE 3

Use a diameter

In $\odot A$, find the lengths of $\overline{CJ}$ and $\overline{AK}$ given $BC = FG = 16$ and $AJ = 5$.



Solution

Diameter $\overline{DE}$ is perpendicular to $\overline{BC}$. So, by Theorem 10.5, $\overline{DE}$ bisects $\overline{BC}$ and $BJ = CJ$. Therefore, $CJ = \frac{1}{2}BC = \frac{1}{2}(16) = 8$. Chords $\overline{BC}$ and $\overline{FG}$ are congruent, so by Theorem 10.6, they are equidistant from A. Therefore, $AK = 5$.

Exercises for Example 3

Use the diagram from Example 3.

5. Find $m\overset{\frown}{BD}$ if $m\overset{\frown}{CD} = 4x°$ and $m\overset{\frown}{BD} = (2x + 40)°$.

6. Find GK if $BC = FG = 20$.

LESSON 10.3