Name____ Date __________

7.3 Using Chords

For use with Exploration 7.3

Essential Question What are two ways to determine when a chord is a diameter of a circle?

1 EXPLORATION: Drawing Diameters

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software to construct a circle of radius 5 with center at the origin. Draw a diameter that has the given point as an endpoint. Explain how you know that the chord you drew is a diameter.

a. $(4, 3)$

b. $(0, 5)$

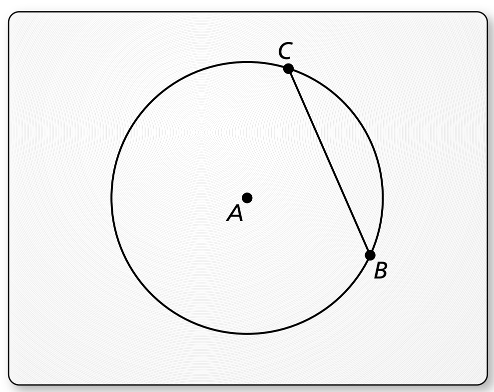
c. $(-3, 4)$

d. $(-5, 0)$

2 EXPLORATION: Writing a Conjecture about Chords

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software to construct a chord $\overline{BC}$ of a circle A. Construct a chord on the perpendicular bisector of $\overline{BC}$. What do you notice? Change the original chord and the circle several times. Are your results always the same? Use your results to write a conjecture.

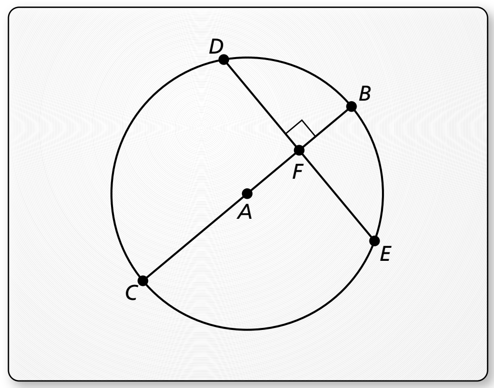


Copyright © Big Ideas Learning, LLC
All rights reserved.

3 EXPLORATION: A Chord Perpendicular to a Diameter

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software to construct a diameter $\overline{BC}$ of a circle A. Then construct a chord $\overline{DE}$ perpendicular to $\overline{BC}$ at point F. Find the lengths DF and EF. What do you notice? Change the chord perpendicular to $\overline{BC}$ and the circle several times. Do you always get the same results? Write a conjecture about a chord that is perpendicular to a diameter of a circle.



Communicate Your Answer

4. What are two ways to determine when a chord is a diameter of a circle?

Copyright © Big Ideas Learning, LLC
All rights reserved.

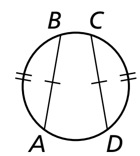
Name____ Date __________

7.3 Practice
For use after Lesson 7.3

Theorems

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.

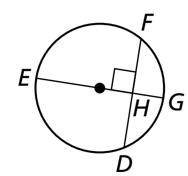


$\overset{\frown}{AB} \cong \overset{\frown}{CD}$ if and only if $\overline{AB} \cong \overline{CD}$.

Notes:

Perpendicular Chord Bisector Theorem

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

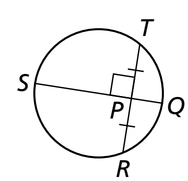


If $\overline{EG}$ is a diameter and $\overline{EG} \perp \overline{DF}$, then $\overline{HD} \cong \overline{HF}$ and $\overset{\frown}{GD} \cong \overset{\frown}{GF}$.

Notes:

Perpendicular Chord Bisector Converse

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



If $\overline{QS}$ is a perpendicular bisector of $\overline{TR}$, then $\overline{QS}$ is a diameter of the circle.

Notes:

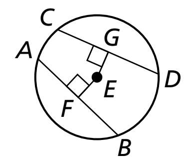
Copyright © Big Ideas Learning, LLC
All rights reserved.

Name ____ Date __________

7.3 Practice (continued)

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.



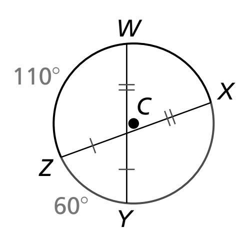
$\overline{AB} \cong \overline{CD}$ if and only if $EF = EG$.

Notes:

Worked-Out Examples

Example #1

Find the measure of $\overset{\frown}{XYZ}$ in $\odot C$.



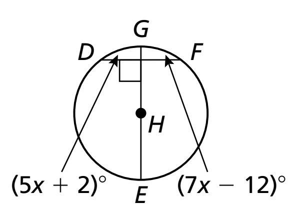
By segment addition, $WY = WC + CY$ and $ZX = ZC + CX$. Because $WC = CX$ and $ZC = YC$, $WY = ZX$. By arc addition, $m\overset{\frown}{XYZ} = m\overset{\frown}{XY} + m\overset{\frown}{YZ}$, $m\overset{\frown}{WZY} = m\overset{\frown}{WZ} + m\overset{\frown}{ZY}$, and $m\overset{\frown}{XYZ} = m\overset{\frown}{XWZ}$. By substitution, $m\overset{\frown}{XY} + m\overset{\frown}{YZ} = m\overset{\frown}{WZ} + m\overset{\frown}{ZY}$, $m\overset{\frown}{XY} + 60° = 110° + 60°$, $m\overset{\frown}{XY} + 60° = 170°$, $m\overset{\frown}{XY} = 110°$. Therefore, $m\overset{\frown}{XYZ} = 110° + 60° = 170°$.

Example #2

Find the value of x.

By the Perpendicular Chord Bisector Theorem:

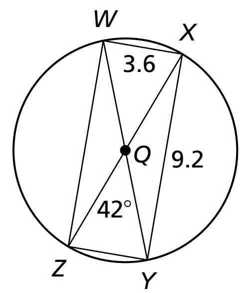
$$5x + 2 = 7x - 12$$
$$-2x + 2 = -12$$
$$-2x = -14$$
$$x = 7$$



Copyright © Big Ideas Learning, LLC
All rights reserved.

Practice A

In Exercises 1–4, find the measure of the arc or chord in $\odot Q$.



1. $m\widehat{WX}$

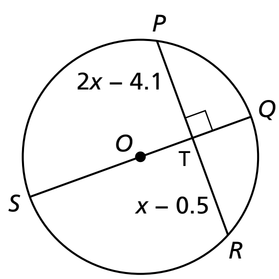
2. YZ

3. WZ

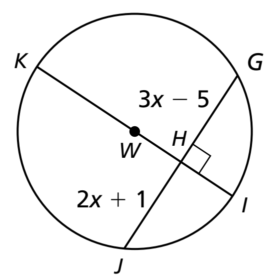
4. $m\widehat{XY}$

In Exercises 5 and 6, find the value of *x*.

5.

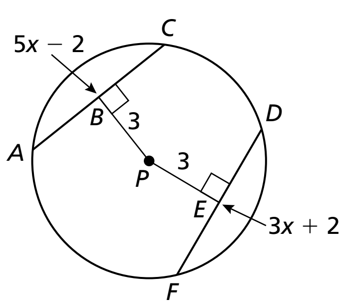


6.

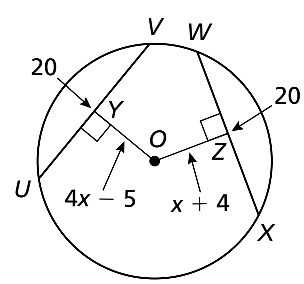


In Exercises 7 and 8, find the radius of the circle.

7.



8.

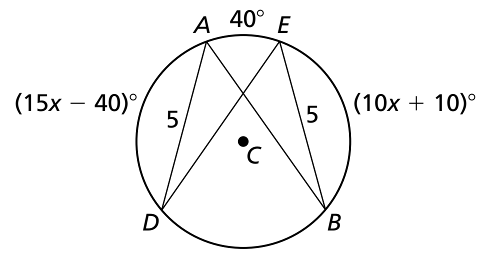


Copyright © Big Ideas Learning, LLC
All rights reserved.

Name______________________________ Date__________

Practice B

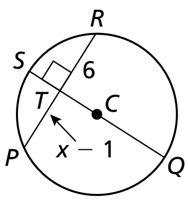
In Exercises 1–4, use the diagram of ⊙*C*.



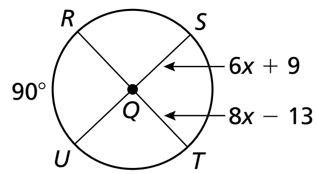
1. Explain why $\overset{\frown}{AD} \cong \overset{\frown}{BE}$.
2. Find the value of x.
3. Find $m\overset{\frown}{AD}$ and $m\overset{\frown}{BE}$.
4. Find $m\overset{\frown}{BD}$.

In Exercises 5–7, find the value of *x*.

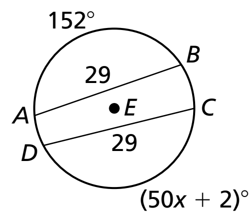
5.



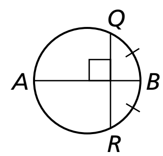
6.



7.

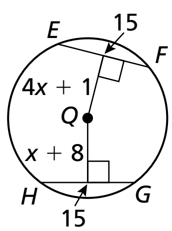


8. Determine whether $\overline{AB}$ is a diameter of the circle. Explain your reasoning.

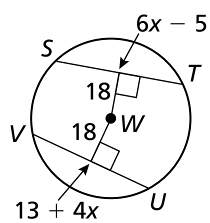


In Exercises 9 and 10, find the radius of ⊙*C*.

9.



10.

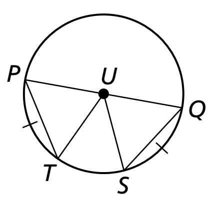


11. Copy and complete the proof.

Given $\overline{PQ}$ is a diameter of ⊙U.

$\overset{\frown}{PT} \cong \overset{\frown}{QS}$

Prove $\triangle PUT \cong \triangle QUS$



STATEMENTS	REASONS
1. $\overline{PQ}$ is a diameter of ⊙U.	1. ____________________
2. ____________________	2. Congruent Corresponding Chords Theorem
3. $\overline{UP} \cong \overline{UQ} \cong \overline{UT} \cong \overline{US}$	3. ____________________
4. $\triangle PUT \cong \triangle QUS$	4. ____________________

12. Briefly explain what other congruence theorem you could use to prove that $\triangle PUT \cong \triangle QUS$ in Exercise 11.

Copyright © Big Ideas Learning, LLC
All rights reserved.