12-2 Chords and Arcs

Vocabulary

Review

Circle the *converse* of each statement.

1. **Statement:** If I am happy, then I sing.

If I sing, then I am happy. | If I am not happy, then I do not sing. | If I do not sing, then I am not happy.

2. **Statement:** If parallel lines are cut by a transversal, then alternate interior angles are congruent.

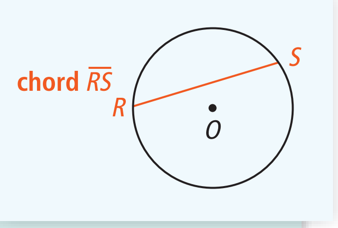
If lines cut by a transversal are not parallel, then alternate interior angles are not congruent. | If lines cut by a transversal form alternate interior angles that are not congruent, then the lines are not parallel. | If lines cut by a transversal form alternate interior angles that are congruent, then the lines are parallel.

Vocabulary Builder

chord (noun) kawrd

Definition: A **chord** is a segment whose endpoints are on a circle.

Related Word: arc



Use Your Vocabulary

3. Complete each statement with *always*, *sometimes*, or *never*.

A *chord* is _?_ a diameter. ____________

A diameter is _?_ a *chord*. ____________

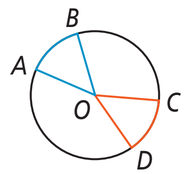
A radius is _?_ a *chord*. ____________

A *chord* _?_ has a related arc. ____________

An arc is _?_ a semicircle. ____________

take note — Theorems 12-4, 12-5, 12-6 and Their Converses

Theorem 12-4 Within a circle or in congruent circles, congruent central angles have congruent arcs.

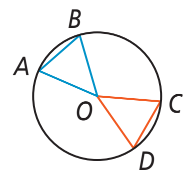


4. If $\angle AOB \cong$ ____, then $\overset{\frown}{AB} \cong \overset{\frown}{CD}$.

Converse Within a circle or in congruent circles, congruent arcs have congruent central angles.

5. If $\overset{\frown}{AB} \cong \overset{\frown}{CD}$, then $\angle AOB \cong$ ____.

Theorem 12-5 Within a circle or in congruent circles, congruent central angles have congruent chords.

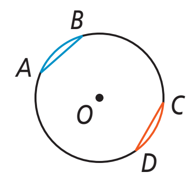


6. If $\angle AOB \cong \angle COD$, then $\overline{AB} \cong$ ____.

Converse Within a circle or in congruent circles, congruent chords have congruent central angles.

7. If $\overline{AB} \cong \overline{CD}$, then ____ $\cong \angle COD$.

Theorem 12-6 Within a circle or in congruent circles, congruent chords have congruent arcs.



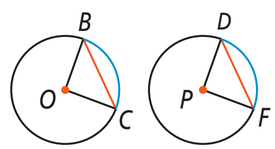
8. If $\overline{AB} \cong$ ____, then $\overset{\frown}{AB} \cong \overset{\frown}{CD}$.

Converse Within a circle or in congruent circles, congruent arcs have congruent chords.

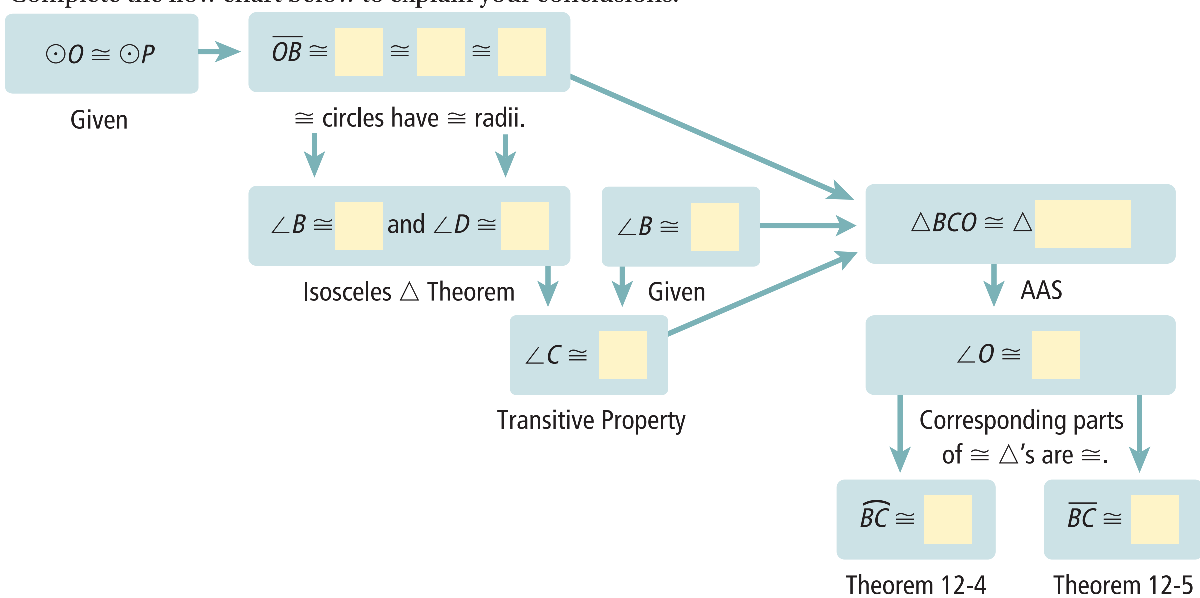
9. If $\overset{\frown}{AB} \cong$ ____, then $\overline{AB} \cong \overline{CD}$.

Problem 1 Using Congruent Chords

Got It? **Use the diagram at the right. Suppose you are given $\odot O \cong \odot P$ and $\angle OBC \cong \angle PDF$. How can you show $\angle O \cong \angle P$? From this, what else can you conclude?**



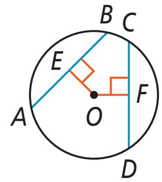
10. Complete the flow chart below to explain your conclusions.



take note — Theorem 12-7 and Its Converse, Theorems 12-8, 12-9, 12-10

Theorem 12-7 Within a circle or in congruent circles, chords equidistant from the center or centers are congruent.

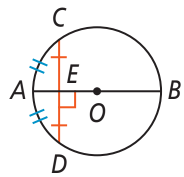
Converse Within a circle or in congruent circles, congruent chords are equidistant from the center (or centers).



11. If $OE = OF$, then $\overline{AB} \cong$ ____.

12. If $\overline{AB} \cong$ ____, then $OE =$ ____.

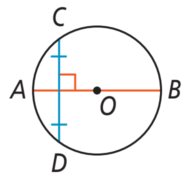
Theorem 12-8 In a circle, if a diameter is perpendicular to a chord, then it bisects the chord and its arc.



13. If $\overline{AB}$ is a diameter and $\overline{AB} \perp \overline{CD}$, then $\overline{CE} \cong$ ____ and $\overset{\frown}{CA} \cong$ ____.

Theorem 12-9 In a circle, if a diameter bisects a chord (that is not a diameter), then it is perpendicular to the chord.

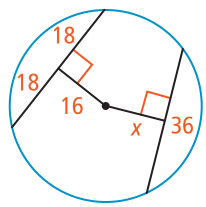
14. If $\overline{AB}$ is a diameter and $\overline{CE} \cong \overline{ED}$, then $\overline{AB} \perp$ ____.



Theorem 12-10 In a circle, the perpendicular bisector of a chord contains the center of the circle.

15. If $\overline{AB}$ is the perpendicular bisector of chord $\overline{CD}$, then ____ contains the center of $\odot O$.

Problem 2 Finding the Length of a Chord



Got It? **What is the value of x? Justify your answer.**

16. What is the measure of each chord? Explain.

____

____

____

____

17. Circle the reason why the chords are congruent.

Chords that have equal measures are congruent.	Chords that are equidistant from the center of a circle are congruent.

18. Circle the theorem that you will use to find the value of x.

Theorem 12-5   Theorem 12-7   Converse of Theorem 12-7

Theorem 12-8   Theorem 12-10

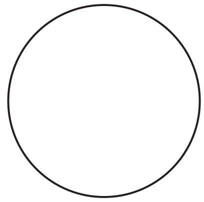
19. Circle the distances from the center of a circle to the chords.

16   18   36 x

20. The value of x is ____.

Problem 3 Using Diameters and Chords

Got It? **The diagram shows the tracing of a quarter. What is its radius?**



Underline the correct word to complete each sentence. Then do each step.

21. First draw two chords / tangents .

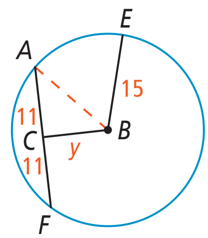
22. Next construct one / two perpendicular bisector(s).

23. Label the intersection *C*. It is the circle's center / chord .

24. Measure the diameter / radius . **25.** The radius is about ____ mm.

Problem 4 Finding Measures in a Circle

Got It? **Reasoning** **In finding *y*, how does the auxiliary $\overline{BA}$ make the problem simpler to solve?**



26. $\overline{BA}$ is the hypotenuse of a right _?_, so you can use the _?_ Theorem to solve for *y*.

______________ ______________

Lesson Check • Do you UNDERSTAND?

Vocabulary **Is a radius a chord? Is a diameter a chord? Explain your answers.**

27. Circle the name(s) of figure(s) that have two endpoints on a circle. Underline the name(s) of figure(s) that have one endpoint on a circle.

chord diameter radius ray segment

28. Is a radius a chord? Is a diameter a chord? Explain.

____

____

Math Success

Check off the vocabulary words that you understand.

☐ circle ☐ chord ☐ radius ☐ diameter

Rate how well you can *use chords to find measures*.

Need to review | 0 2 4 6 8 10 | Now I get it!