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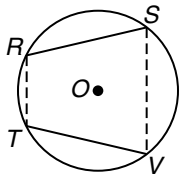
10-3 Study Guide and Intervention

Arcs and Chords

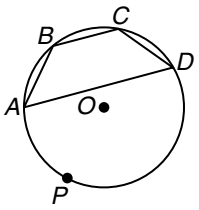
Arcs and Chords Points on a circle determine both chords and arcs. Several properties are related to points on a circle.



$\overset{\frown}{RS} \cong \overset{\frown}{TV}$ if and only if $\overline{RS} \cong \overline{TV}$.
RSVT is inscribed in $\odot O$.
$\odot O$ is circumscribed about *RSVT*.

- In a circle or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.
- If all the vertices of a polygon lie on a circle, the polygon is said to be **inscribed** in the circle and the circle is **circumscribed** about the polygon.

Example **Trapezoid *ABCD* is inscribed in $\odot O$. If $\overline{AB} \cong \overline{BC} \cong \overline{CD}$ and $m\overset{\frown}{BC} = 50$, what is $m\overset{\frown}{APD}$?**



Chords $\overline{AB}$, $\overline{BC}$, and $\overline{CD}$ are congruent, so $\overset{\frown}{AB}$, $\overset{\frown}{BC}$, and $\overset{\frown}{CD}$ are congruent. $m\overset{\frown}{BC} = 50$, so $m\overset{\frown}{AB} + m\overset{\frown}{BC} + m\overset{\frown}{CD} = 50 + 50 + 50 = 150$. Then $m\overset{\frown}{APD} = 360 - 150$ or 210.

Exercises

Each regular polygon is inscribed in a circle. Determine the measure of each arc that corresponds to a side of the polygon.

1. hexagon

2. pentagon

3. triangle

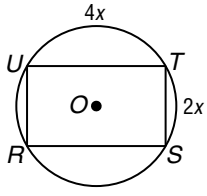
4. square

5. octagon

6. 36-gon

Determine the measure of each arc of the circle circumscribed about the polygon.

7.



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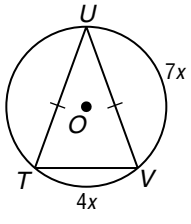

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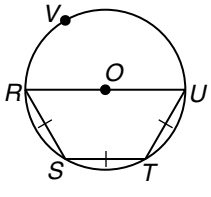


Lesson 10-3

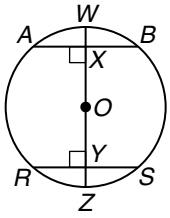
NAME _____ DATE _____ PERIOD _____

10-3 Study Guide and Intervention *(continued)*

Arcs and Chords

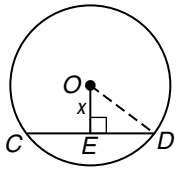
Diameters and Chords

- In a circle, if a diameter is perpendicular to a chord, then it bisects the chord and its arc.
- In a circle or in congruent circles, two chords are congruent if and only if they are equidistant from the center.



If $\overline{WZ} \perp \overline{AB}$, then $\overline{AX} \cong \overline{XB}$ and $\overline{AW} \cong \overline{WB}$.
If $OX = OY$, then $\overline{AB} \cong \overline{RS}$.
If $\overline{AB} \cong \overline{RS}$, then $\overline{AB}$ and $\overline{RS}$ are equidistant from point O.

Example **In $\odot O$, $\overline{CD} \perp \overline{OE}$, $OD = 15$, and $CD = 24$. Find x.**



A diameter or radius perpendicular to a chord bisects the chord, so ED is half of CD.

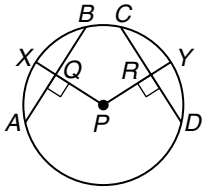
$$ED = \frac{1}{2}(24)$$
$$= 12$$

Use the Pythagorean Theorem to find x in $\triangle OED$.

$(OE)^2 + (ED)^2 = (OD)^2$	Pythagorean Theorem
$x^2 + 12^2 = 15^2$	Substitution
$x^2 + 144 = 225$	Multiply.
$x^2 = 81$	Subtract 144 from each side.
$x = 9$	Take the square root of each side.

Exercises

In $\odot P$, $CD = 24$ and $m\widehat{CY} = 45$. Find each measure.

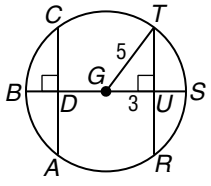


1. AQ **2.** RC **3.** QB

4. AB **5.** $m\widehat{DY}$ **6.** $m\widehat{AB}$

7. $m\widehat{AX}$ **8.** $m\widehat{XB}$ **9.** $m\widehat{CD}$

In $\odot G$, $DG = GU$ and $AC = RT$. Find each measure.



10. TU **11.** TR **12.** $m\widehat{TS}$

13. CD **14.** GD **15.** $m\widehat{AB}$

16. A chord of a circle 20 inches long is 24 inches from the center of a circle. Find the length of the radius.

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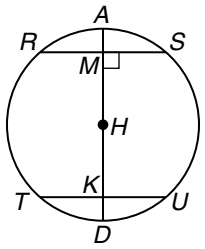
10-3 Skills Practice

Arcs and Chords

In $\odot H$, $m\overset{\frown}{RS} = 82$, $m\overset{\frown}{TU} = 82$, $RS = 46$, and $\overline{TU} \cong \overline{RS}$. Find each measure.



1. TU

2. TK

3. MS

4. $m\angle HKU$

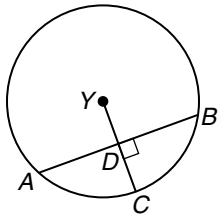
5. $m\overset{\frown}{AS}$

6. $m\overset{\frown}{AR}$

7. $m\overset{\frown}{TD}$

8. $m\overset{\frown}{DU}$

The radius of $\odot Y$ is 34, $AB = 60$, and $m\overset{\frown}{AC} = 71$. Find each measure.



9. $m\overset{\frown}{BC}$

10. $m\overset{\frown}{AB}$

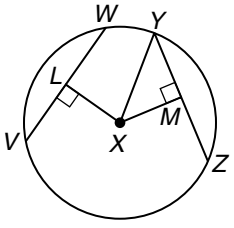
11. AD

12. BD

13. YD

14. DC

In $\odot X$, $LX = MX$, $XY = 58$, and $VW = 84$. Find each measure.



15. YZ

16. YM

17. MX

18. MZ

19. LV

20. LX

Lesson 10-3

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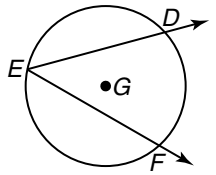
10-4 Study Guide and Intervention

Inscribed Angles

Inscribed Angles An **inscribed angle** is an angle whose vertex is on a circle and whose sides contain chords of the circle. In $\odot G$, inscribed $\angle DEF$ **intercepts** $\overset{\frown}{DF}$.



$m\angle DEF = \frac{1}{2}m\overset{\frown}{DF}$

Inscribed Angle Theorem	If an angle is inscribed in a circle, then the measure of the angle equals one-half the measure of its intercepted arc.

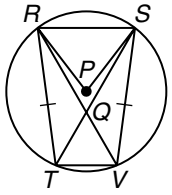
Example **In $\odot G$ above, $m\overset{\frown}{DF} = 90$. Find $m\angle DEF$.**

$\angle DEF$ is an inscribed angle so its measure is half of the intercepted arc.

$$m\angle DEF = \frac{1}{2}m\overset{\frown}{DF}$$
$$= \frac{1}{2}(90) \text{ or } 45$$

Exercises

Use $\odot P$ for Exercises 1–10. In $\odot P$, $\overline{RS} \parallel \overline{TV}$ and $\overline{RT} \cong \overline{SV}$.



1. Name the intercepted arc for $\angle RTS$.

2. Name an inscribed angle that intercepts $\overset{\frown}{SV}$.

In $\odot P$, $m\overset{\frown}{SV} = 120$ and $m\angle RPS = 76$. Find each measure.

3. $m\angle PRS$

4. $m\overset{\frown}{RSV}$

5. $m\overset{\frown}{RT}$

6. $m\angle RVT$

7. $m\angle QRS$

8. $m\angle STV$

9. $m\overset{\frown}{TV}$

10. $m\angle SVT$

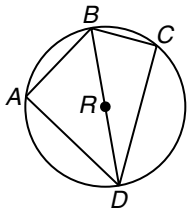
Lesson 10-4

NAME _____ DATE _____ PERIOD _____

10-4 Study Guide and Intervention *(continued)*

Inscribed Angles

Angles of Inscribed Polygons An **inscribed polygon** is one whose sides are chords of a circle and whose vertices are points on the circle. Inscribed polygons have several properties.



- If an angle of an inscribed polygon intercepts a semicircle, the angle is a right angle.

If $\overset{\frown}{BCD}$ is a semicircle, then $m\angle BCD = 90$.

- If a quadrilateral is inscribed in a circle, then its opposite angles are supplementary.

For inscribed quadrilateral $ABCD$, $m\angle A + m\angle C = 180$ and $m\angle ABC + m\angle ADC = 180$.

Example **In $\odot R$ above, $BC = 3$ and $BD = 5$. Find each measure.**

a. $m\angle C$

$\angle C$ intercepts a semicircle. Therefore $\angle C$ is a right angle and $m\angle C = 90$.

b. CD

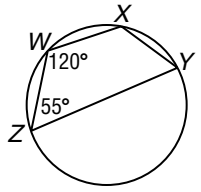
$\triangle BCD$ is a right triangle, so use the Pythagorean Theorem to find CD.

$$(CD)^2 + (BC)^2 = (BD)^2$$
$$(CD)^2 + 3^2 = 5^2$$
$$(CD)^2 = 25 - 9$$
$$(CD)^2 = 16$$
$$CD = 4$$

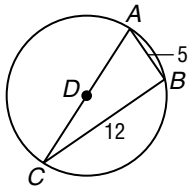
Exercises

Find the measure of each angle or segment for each figure.

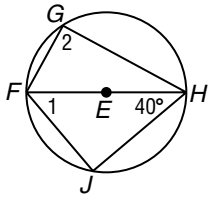
1. $m\angle X, m\angle Y$



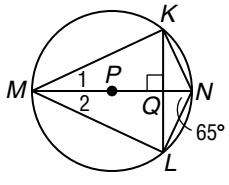
2. AD



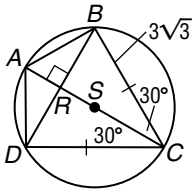
3. $m\angle 1, m\angle 2$



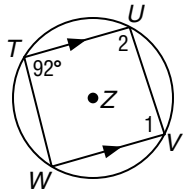
4. $m\angle 1, m\angle 2$



5. AB, AC



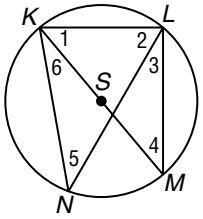
6. $m\angle 1, m\angle 2$



10-4 Skills Practice

Inscribed Angles

In $\odot S$, $m\widehat{KL} = 80$, $m\widehat{LM} = 100$, and $m\widehat{MN} = 60$. Find the measure of each angle.



1. $m\angle 1$

2. $m\angle 2$

3. $m\angle 3$

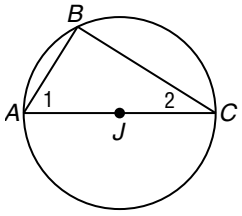
4. $m\angle 4$

5. $m\angle 5$

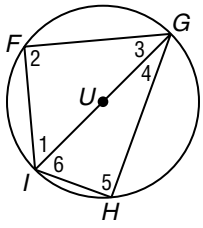
6. $m\angle 6$

ALGEBRA Find the measure of each numbered angle.

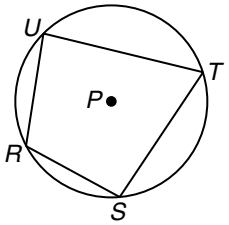
7. $m\angle 1 = 5x - 2$, $m\angle 2 = 2x + 8$



8. $m\angle 1 = 5x$, $m\angle 3 = 3x + 10$, $m\angle 4 = y + 7$, $m\angle 6 = 3y + 11$



Quadrilateral $RSTU$ is inscribed in $\odot P$ such that $m\widehat{STU} = 220$ and $m\angle S = 95$. Find each measure.



9. $m\angle R$

10. $m\angle T$

11. $m\angle U$

12. $m\widehat{SRU}$

13. $m\widehat{RUT}$

14. $m\widehat{RST}$

Lesson 10-4