Reteach

Lines That Intersect Circles

Identify each line or segment that intersects each circle.

1. __________________________________________________________________________

2. __________________________________________________________________________

Find the length of each radius. Identify the point of tangency and write the equation of the tangent line at that point.

3. __________________________________________________________________________

4. __________________________________________________________________________
In the figure above, $EF = 2y$ and $EG = y + 8$. Find $EF$.

$EF = EG \quad \text{2 segs. tangent to } \bigodot \text{ from same ext. pt. } \rightarrow \text{ segs. } \cong$.

$2y = y + 8 \quad \text{Substitute } 2y \text{ for } EF \text{ and } y + 8 \text{ for } EG.$

$y = 8 \quad \text{Subtract } y \text{ from each side.}$

$EF = 2(8) \quad EF = 2y; \text{ substitute } 8 \text{ for } y.$

$= 16 \quad \text{Simplify.}$

The segments in each figure are tangent to the circle. Find each length.

5. $BC$

6. $LM$

7. $RS$

8. $JK$
Answers for the chapter Circles

12-1 LINES THAT INTERSECT CIRCLES

Practice A


Practice B

1. chords: \( \overline{BC} \); secant: \( \overline{BC} \); tangent: \( \ell \); diam.: \( \overline{BC} \); radii: \( \overline{AB}, \overline{AC} \)
2. chords: \( \overline{RQ}, \overline{ST} \); secant: \( \overline{ST} \); tangent: \( \overline{UV} \); diam.: \( \overline{RQ} \); radii: \( \overline{PQ}, \overline{PR}, \overline{PU} \)
3. radius of \( \odot D \): 4; radius of \( \odot E \): 2; pt. of tangency: \((0, -4)\); eqn. of tangent line: \(y = -4\)
4. radius of \( \odot M \): 1; radius of \( \odot N \): 3; pt. of tangency: \((-2, -2)\); eqn. of tangent line: \(x = -2\)
5. 385,734 km  6. 7.8 m  7. 50 ft

Practice C

1. Possible answer: Draw \( \overline{AB} \). A tangent segment is perpendicular to a radius at the point of tangency. So \( \angle ACD \) and \( \angle BDC \) are right angles. Two segments perpendicular to the same segment are parallel, so \( \overline{AC} \) and \( \overline{BD} \) are parallel. Because \( \overline{AC} \) and \( \overline{BD} \) are radii of \( \odot A \) and \( \odot B \), they are congruent. Therefore \( ABDC \) is a parallelogram. Opposite sides in a parallelogram are congruent, so \( \overline{CD} \equiv \overline{AB} \). Similar reasoning will show that \( \overline{EF} \equiv \overline{AB} \). By the Transitive Property of Congruence, \( \overline{CD} \equiv \overline{EF} \).

2. Possible answer: It is given that \( \overline{RS} \) and \( \overline{TU} \) are not parallel, so they must meet at some point. Call this point \( X \). \( \overline{XR} \) and \( \overline{XT} \) are tangent to \( \odot P \) and \( \odot Q \). Because tangent segments from a common point to a circle are congruent, \( X \equiv X \) and \( X \equiv X \). The Segment Addition Postulate shows that \( X \equiv X + X \) and \( X \equiv X + U \). Thus, by the Transitive Property, \( X \equiv X + X \). By the Addition Property of Equality, \( X \equiv X \), and therefore \( \overline{RS} \parallel \overline{TU} \).

3. Possible answer: It is given that \( \overline{IM} \) and \( \overline{JL} \) are tangent segments. They intersect at point \( K \). Because tangent segments from a common point to a circle are congruent, \( K \equiv K \) and \( K \equiv K \). By the Addition Property of Equality, \( K \equiv K + K \). The Segment Addition Postulate shows that \( IM = K + K \) and \( JL = K + K \). Thus, by the Transitive Property of Equality, \( IM = J \) and therefore \( IM \parallel JL \).

4. 50 m  5. 8.5 ft or 16.5 ft

Reteach

1. chord: \( \overline{FG} \); secant: \( \ell \); tangent: \( m \); diam.: \( \overline{FG} \); radii: \( \overline{HF} \) and \( \overline{HG} \)
2. chord: \( \overline{LM} \); secant: \( \overline{LM} \); tangent: \( \overline{MN} \); radius: \( \overline{JK} \)
3. \( \odot N \): \( r = 3 \); \( \odot P \): \( r = 1 \); pt. of tangency: \((-1, -2)\); tangent line: \(y = -2\)
4. \( \odot S \): \( r = 4 \); \( \odot T \): \( r = 2 \); pt. of tangency: \((7, 0)\); tangent line: \(x = 7\)
5. 6  6. 14  7. 10  8. 19

Challenge

1. \( ST = SU \)
2. If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency (Theorem 11-1-1).
3. If two segments are tangent to a circle from the same external point, then the