Answers

1. A tangent line is perpendicular to the radius of the circle at the point of tangency.
2. It appears that A is the only point of intersection, but by the Triangle Angle Sum Theorem, $m\angle A = 89°$, so $\overline{AB}$ is not perpendicular to $\overline{AG}$, so $\overline{AB}$ is not a tangent.
3. Yes; there is a radius to every point on the circle, and there is a perpendicular to every radius.
4. Since $\angle APQ$, $\angle QSA$, $\angle QSB$, and $\angle QRB$ are right angles, $\angle PAS$ and $\angle PQS$ are supplementary, and $\angle RBS$ and $\angle RQS$ are supplementary. But since $\angle PQS$ and $\angle RQS$ form a linear pair, they are also supplementary. So, $\angle PAS \cong \angle RQS$ and $\angle RBS \cong \angle PQS$.
5. no
6. yes
7. 59°
8. $2\sqrt{14}$
9. 17
10. 72°

14. Given: $\odot T$ with tangent $\overline{DE}$ and point of tangency E, and tangent $\overline{DF}$ and point of tangency F

Prove: $\overline{DE} \cong \overline{DF}$

Proof: Since $\overline{TE}$ and $\overline{TF}$ are both radii of $\odot T$, $\overline{TE} \cong \overline{TF}$. Since $\overline{DE}$ is a tangent at E, $\angle TED$ is a right angle. Similarly, $\angle TFD$ is a right angle. Draw $\overline{TD}$. $\overline{TD} \cong \overline{TD}$, and $\overline{TD}$ is the hypotenuse of right triangles $\triangle TED$ and $\triangle TFD$, so by HL, $\triangle TED \cong \triangle TFD$. Therefore, by CPCTC, $\overline{DE} \cong \overline{DF}$.

See answers for Exercises 15, 21 on next page.

Scan for Multimedia

Practice Tutorial

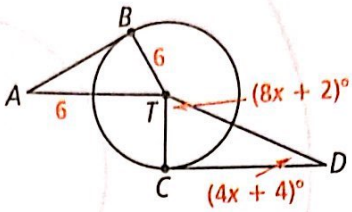
Additional Exercises Available Online

PRACTICE

The segments $\overline{AB}$ and $\overline{CD}$ are tangent to $\odot T$. Find each value. SEE EXAMPLES 1 AND 2

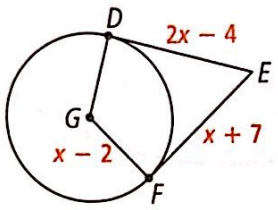
16. AB $6\sqrt{3}$

17. $m\angle TDC$ $32°$

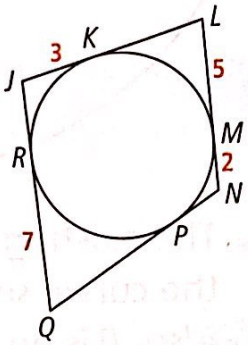


For Exercises 18–20, the segments are tangent to the circle. Find each value. SEE EXAMPLES 3 AND 4

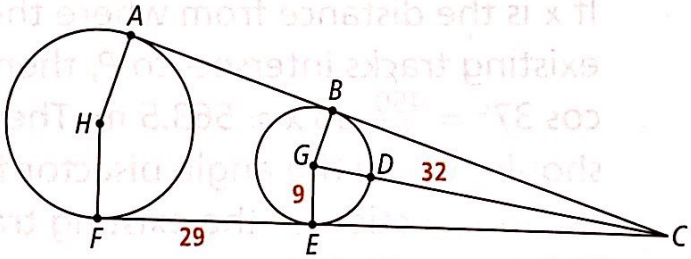
18. DG 9



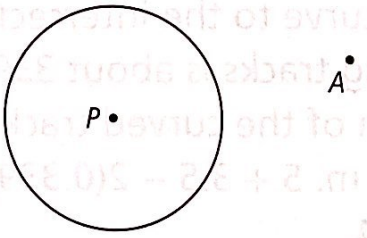
19. Perimeter of $JLNQ$ 34



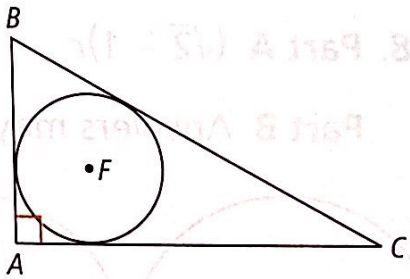
20. AC 69



21. Trace $\odot P$ and point A. Construct a tangent to $\odot P$ that passes through A. SEE EXAMPLE 5



22. The diameter of $\odot F$ is 8; $AB = 10$; and $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are tangent to $\odot F$. What is the perimeter of $\triangle ABC$? 60



Answers

15. 2x; By Theorem 10-2, $AC = FC$, $AB = BD$, and $DE = EF$. So, $BD + BC = CA$, and $DE + EC = FC$.

ASSESSMENT PRACTICE

26. Circle P is described by the equation $(x + 3)^2 + (y - 2)^2 = 25$. Which of the following lines are tangent to $\odot P$? Select all that apply.

Ⓐ $y = x + 3$

Ⓑ $y = 5$

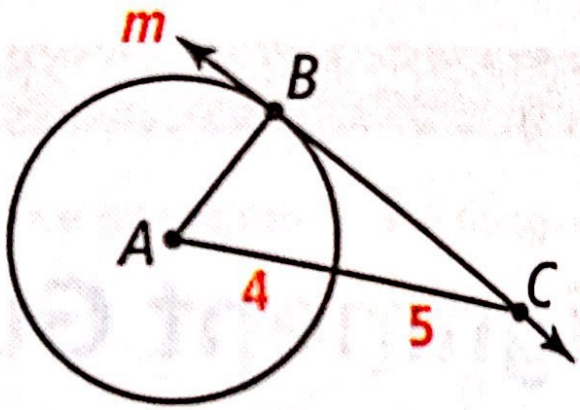
Ⓒ $y = x$

Ⓓ $x = 2$

Ⓔ $y = -3$

Ⓕ $y = x - 3$

27. **SAT/ACT** Line m is tangent to $\odot A$ at B. What is the area of $\triangle ABC$?



Ⓐ 10

Ⓑ 18

Ⓒ $2\sqrt{65}$

Ⓓ $\frac{5\sqrt{65}}{2}$

28. **Performance Task** The African art design below is based on circles that are tangent to each other.