

Tangent Theorem

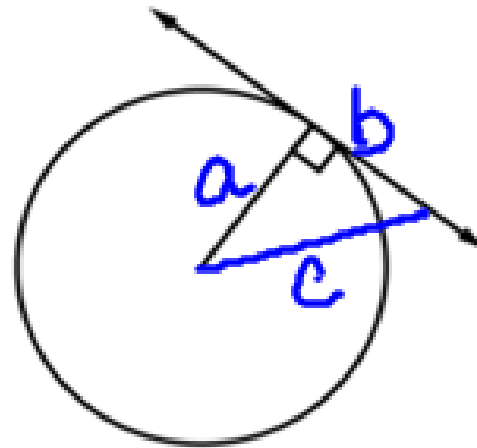
If a line is tangent to a circle, then the line is perpendicular to the radius from the point of tangency.

Converse:

If a line in the plane of the circle is perpendicular to a radius at its endpoint on the circle, then the line is tangent to the circle.



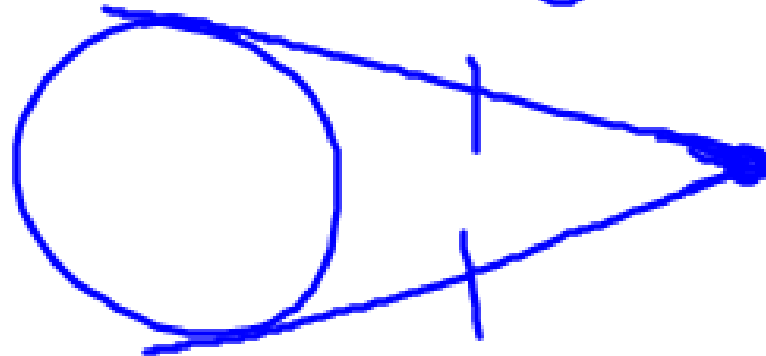
How could we prove the Tangent Theorem using the figure below?



Pythagorean
Theorem
 $a^2 + b^2 = c^2$

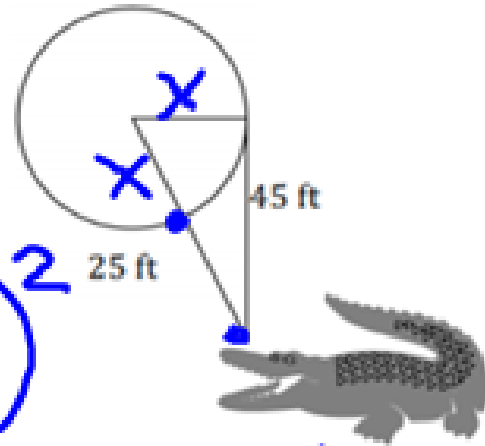
Tangent Segment Theorem

If two segments are tangent to the same exterior point, they are congruent.



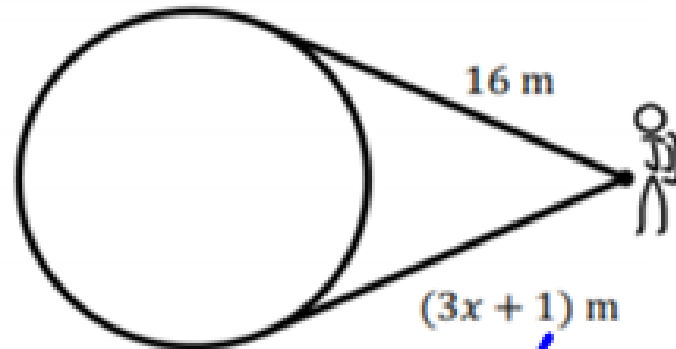
Let's Practice!

3. Albert the Alligator is sunning himself next to his favorite, perfectly circular pond. He is 25 feet from the bank and 45 feet from the point of tangency. Determine the radius of Albert's favorite pond using the given information.



$$\begin{aligned} 45^2 + x^2 &= (x + 25)^2 \\ 2025 + x^2 &= (x + 25)(x + 25) \\ 2025 + x^2 &= x^2 + 25x + 25x + 625 \\ 2025 + \cancel{x^2} &= \cancel{x^2} + 50x + 625 \\ - 625 & \qquad \qquad \qquad - 625 \\ \hline 1400 &= 50x \quad x = \textcircled{28} \end{aligned}$$

4. George is standing in front of a silo and can only see as far as the diagram shows. Determine the value of x . Support your conclusion with a theorem.

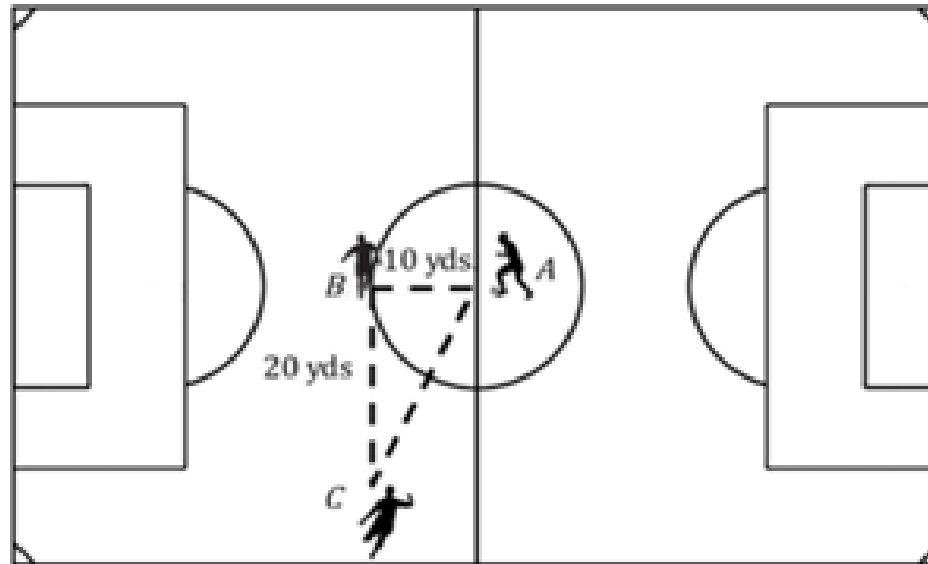


Tangent Segment Theorem

$$\begin{array}{r} 16 = 3x + 1 \\ - 1 \quad - 1 \\ \hline 15 = 3x \\ 5 = x \end{array}$$

Try It!

5. Three teammates from a local soccer club are practicing passing in triangular pattern as shown in the diagram below.

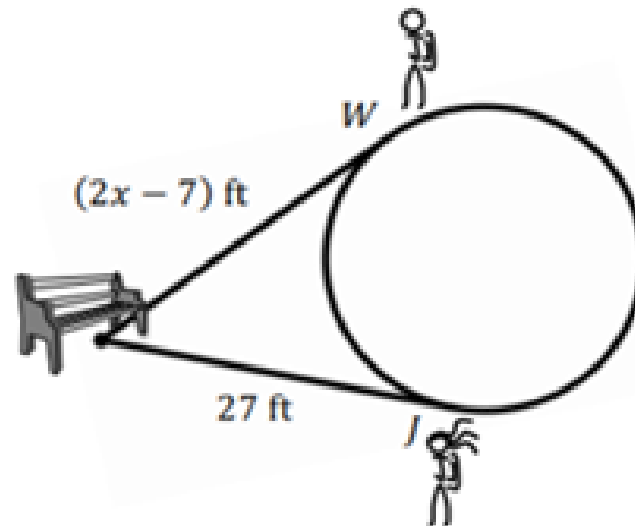


Player *A* has the ball and is 10 yards from Player *B*, who is 20 yards from Player *C*. How far would the ball travel if Player *A* decides to pass the ball to Player *C*? Justify your answer.

$$10^2 + 20^2 = x^2$$
$$100 + 400 = x^2$$
$$\sqrt{500} = x$$

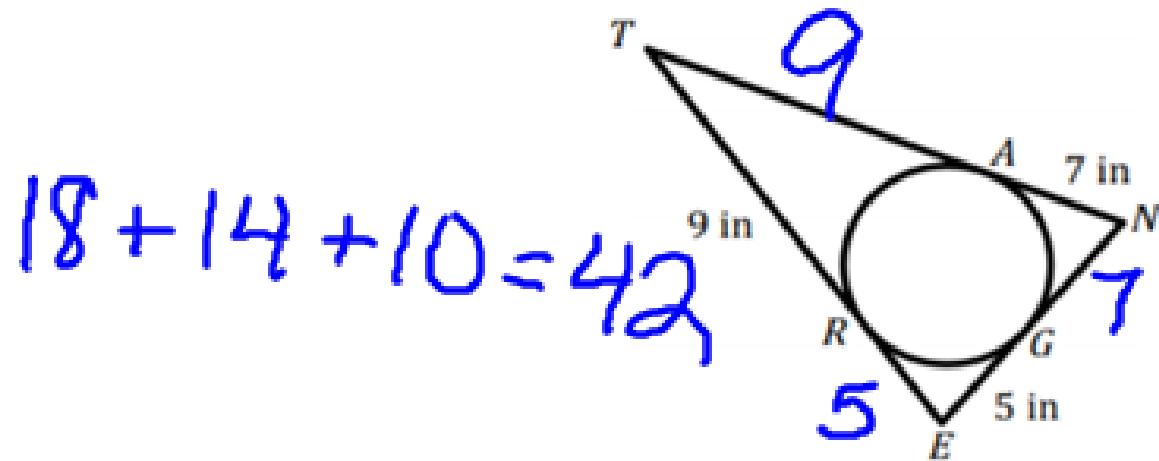
x = the answer

6. Jasmyn is standing at the point of tangency to a wishing well, 27 feet from a bench. Her friend Willard is at the other point of tangency. Determine the value of x .



$$\begin{array}{r} 2x - 7 = 27 \\ + 7 \quad + 7 \\ \hline 2x = 34 \\ y = 17 \quad x = 17 \end{array}$$

7. Find the perimeter of the $\triangle NET$ in the diagram below. Points A , R , and G are points of tangency. Justify your answer.

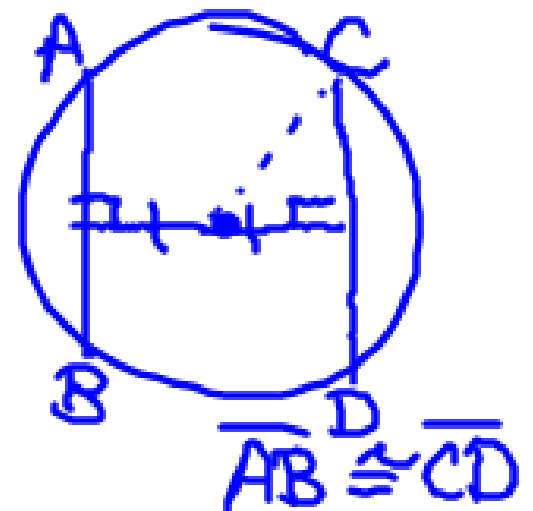
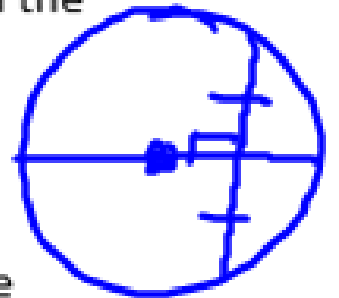


Perpendicular to a chord Theorem

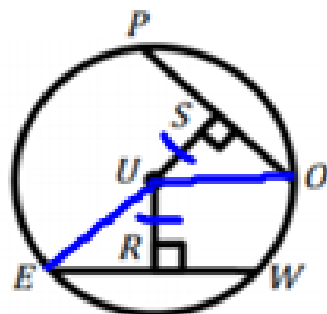
If the diameter of a circle is perpendicular to a chord, then the diameter bisects the chord.

Chords distance to center Theorem

In congruent circles or the same circle, chords are congruent if and only if they are equidistance from the center.



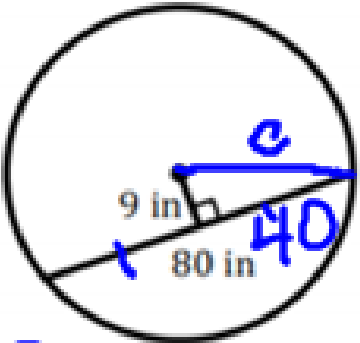
How could we prove the Chords Distance to Center Theorem using the figure below, where $\overline{EW} \cong \overline{PO}$ if and only if $\overline{UR} \cong \overline{US}$?



Use Pythagorean Theorem
on both $\triangle UE$ & $\triangle UO$
then \triangle 's are \cong by CPCTC
Sides are \cong .

Try III

2. Determine the radius of the circle shown below.



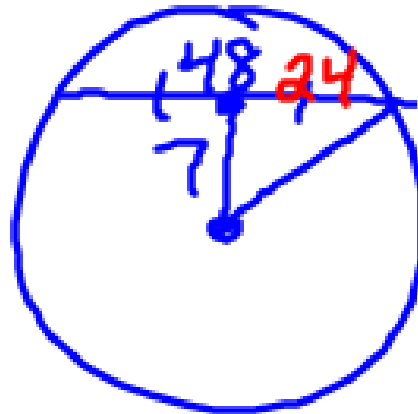
$c^2 + 40^2 = c^2$

$81 + 1600 = c^2$

$\sqrt{1681} = \sqrt{c^2}$

$41 = c$

3. A chord of a circular clock is 48 inches long and has a midpoint that is 7 inches from the center of the circle. Determine the radius of the clock. Justify your answer.



$$24^2 + 7^2 = c^2$$

$$576 + 49 = c^2$$

$$625 = c^2$$

$$25 = c$$