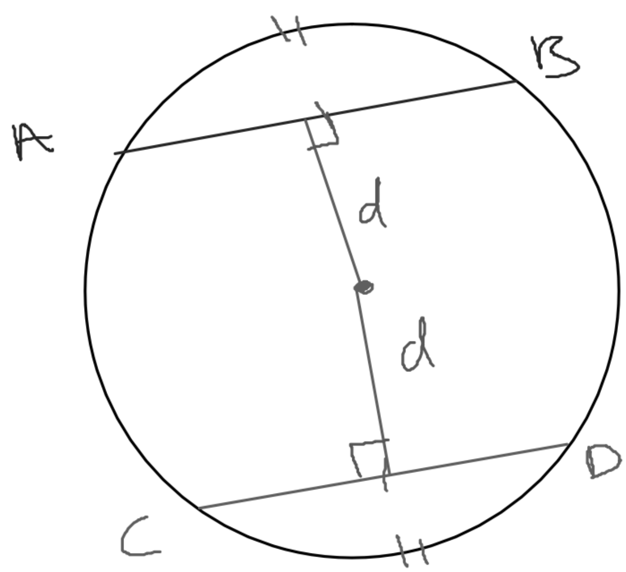
A chord is a segment whose endpoints are on a circle.

$\overline{AB} \cong \overline{CD}$

$\overset{\frown}{AB} \cong \overset{\frown}{CD}$



Congruent Chords

Theorem 10-3 and the Converse

Theorem

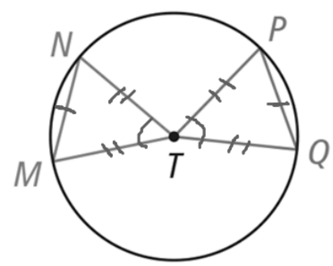
If two chords in a circle or in congruent circles are congruent, then their central angles are congruent.

Converse

If two central angles in a circle or in congruent circles are congruent, then their chords are congruent.

PROOF: SEE EXERCISES 12 AND 13.

If... $\overline{MN} \cong \overline{PQ}$
Then... $\angle MTN \cong \angle PTQ$



If... $\angle MTN \cong \angle PTQ$
Then... $\overline{MN} \cong \overline{PQ}$

Congruent Chords continuted

Theorem 10-4 and the Converse

Theorem

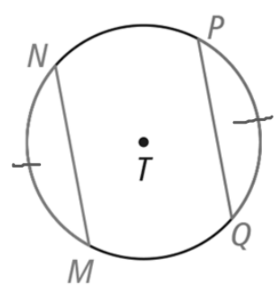
If two arcs in a circle or in congruent circles are congruent, then their chords are congruent.

Converse

If two chords in a circle or in congruent circles are congruent, then their arcs are congruent.

PROOF: SEE EXAMPLE 2 AND EXAMPLE 2 TRY IT.

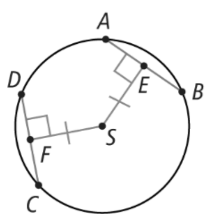
If... $\overset{\frown}{MN} \cong \overset{\frown}{PQ}$
Then... $\overline{MN} \cong \overline{PQ}$



If... $\overline{MN} \cong \overline{PQ}$
Then... $\overset{\frown}{MN} \cong \overset{\frown}{PQ}$

Theorem
If chords are equidistant from the center of a circle or the centers of congruent circles, then they are congruent.

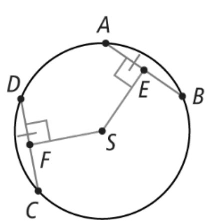
If... $\overline{SE} \cong \overline{SF}$,



Then... $\overline{AB} \cong \overline{CD}$

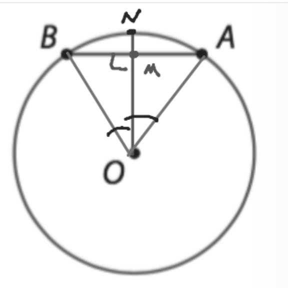
Converse
If chords in a circle or in congruent circles are congruent, then they are equidistant from the center or centers.

If... $\overline{AB} \cong \overline{CD}$,



Then... $\overline{SE} \cong \overline{SF}$

Given the figure at the right.



Estimate the midpoint M on segment $\overline{AB}$ and label that point.

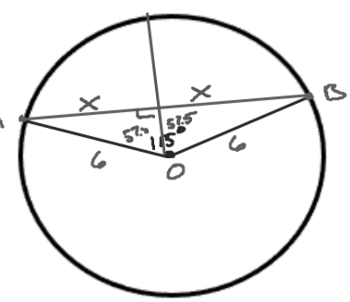
Draw a line through O and M so that $\overline{OM} \perp \overline{AB}$.

What Three things happen?

- Radius/Diameter Bisect Chord $\overline{AM} \cong \overline{BM}$
- Radius/Diameter Bisect intercepted Arc $\widehat{AN} \cong \widehat{BN}$
- Radius/Diameter Bisect Central $\angle$. $\angle AOM \cong \angle BOM$

Suppose that a given circle has a radius of 6 inches.

What is the length of a chord that has a central angle of 115°?



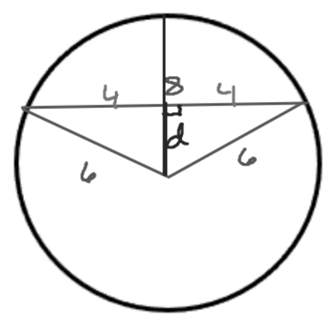
$\sin 57.5 = \frac{x}{6}$

$x = 6 \sin 57.5$

$= 5.06$

$AB = 10.12''$

What is the measure of the arc of a chord that is 8 inches long? What is the perpendicular distance from the center of the circle to the chord?



$d^2 + 4^2 = 6^2$

$d^2 + 16 = 36$

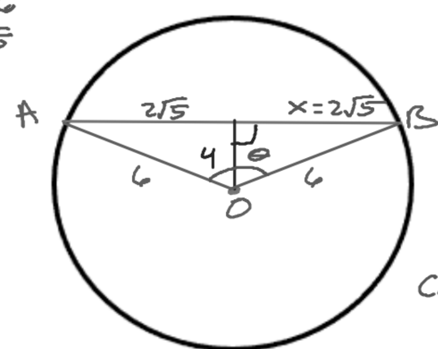
$d^2 = 20$

$d = \sqrt{20} = 2\sqrt{5} \approx 4.47$

$x^2+4^2=6^2$

$x=2\sqrt{5}$

The perpendicular distance from the center of the circle to a chord is 4 inches. What is the length of the chord? What is the measure of its central angle?



$AB = 4\sqrt{5}$

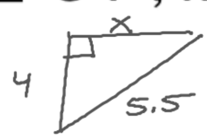
$m\angle AOB = 96.38^\circ$

$\cos\theta = \frac{4}{6}$

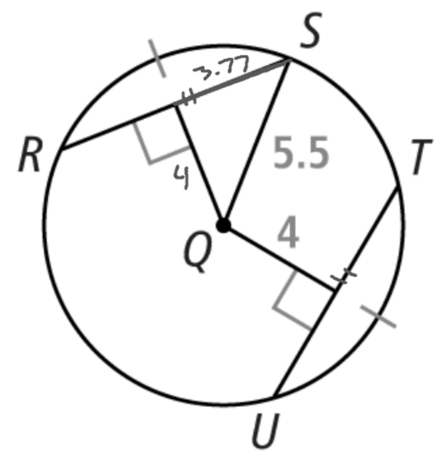
$\cos^{-1}\left(\frac{4}{6}\right)=\theta$

$\theta = 48.19$

Given $\widehat{RS} \cong \widehat{UT}$, how can you find UT?



$UT = 7.54$



$x^2 + 4^2 = 5.5^2$

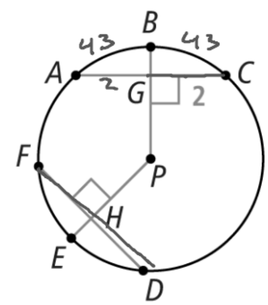
$x^2 + 16 = 30.25$

$x^2 = 14.25$

$x = 3.77$

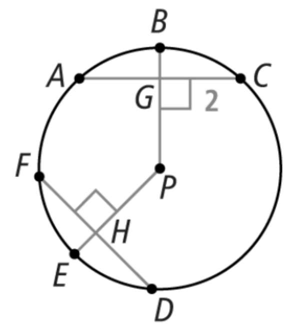
5. In $\odot P$, $m\widehat{AB} = 43$, and $AC = DF$. Find DF.

Enter your answer.



6. In $\odot P$, $m\widehat{AB} = 43$, and $AC = DF$. Find $m\widehat{AC}$.

7. In $\odot P$, $m\widehat{AB} = 43$, and $AC = DF$. Find FH.



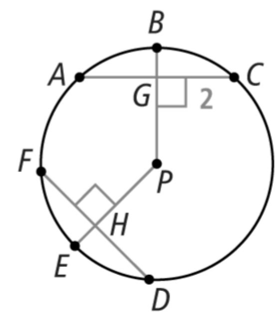
Enter your answer.

8. In $\odot P$, $m\widehat{AB} = 43$, and $AC = DF$. Find $m\widehat{DE}$.

9. In $\odot P$, $m\overset{\frown}{AB} = 43$, and $AC = DF$. Find AC.

Enter your answer.

CHECK ANSWER



10. In $\odot P$, $m\overset{\frown}{AB} = 43$, and $AC = DF$. Find $m\overset{\frown}{DF}$.