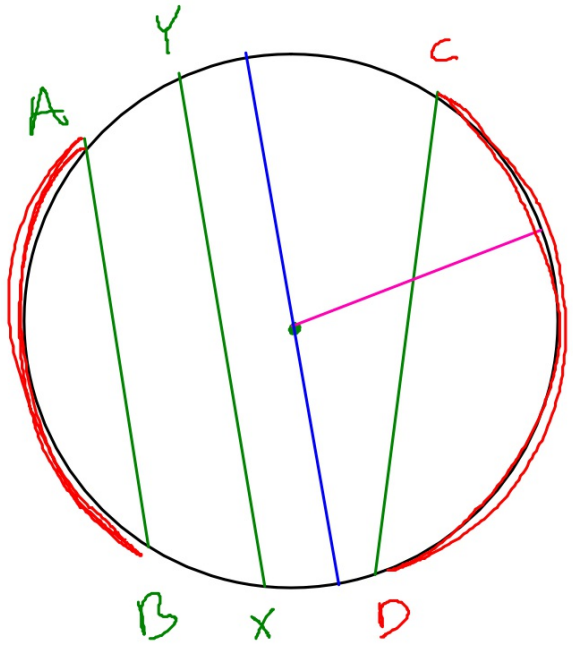
A chord is a segment whose endpoints are on a circle.



Congruent Chords

Theorem 10-3 and the Converse

Theorem

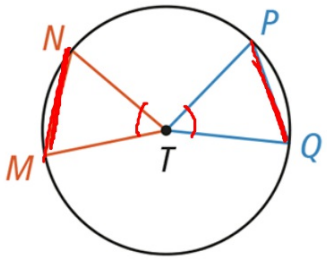
If two chords in a circle or in congruent circles are congruent, then their central angles are congruent.

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

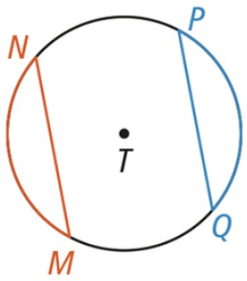
If two arcs in a circle or in congruent circles are congruent, then their chords are congruent.

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.

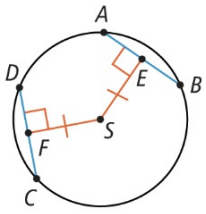
If... $\overset{\frown}{MN} \cong \overset{\frown}{PQ}$
Then... $\overline{MN} \cong \overline{PQ}$



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.

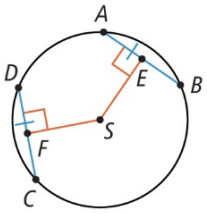
If... $\overline{SE} \cong \overline{SF}$,



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

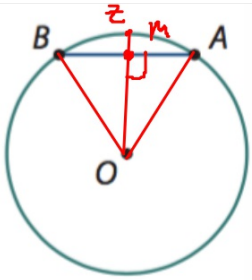
Converse
If chords in a circle or in congruent circles are congruent, then they are equidistant from the center or centers.

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.

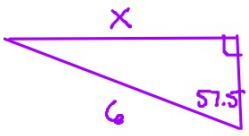
Draw a line through O and M so that $\overline{OM} \perp \overline{AB}$.

What Three things happen?

- Bisect the Chord $\overline{AM} \cong \overline{BM}$
- Bisect the intercepted Arc $\overset{\frown}{BZ} \cong \overset{\frown}{AZ}$
- Bisect the central Angle $\angle BOM \cong \angle AOM$

Suppose that a given circle has a radius of 6 inches. 10.12 in

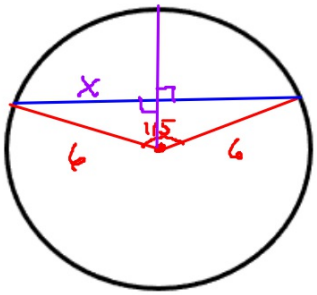
What is the length of a chord that has a central angle of 115°?



$6(\sin 57.5^\circ) = \left(\frac{x}{6}\right)6$

$6 \sin 57.5 = x$

$x = 5.06$



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?