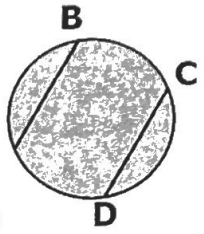
7.3 Properties of Chords

Theorem: In the same circle, or in ≅ circles, 2 minor arcs are ≅ iff their corresponding chords are ≅.

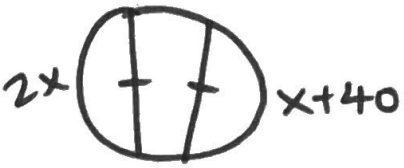


$\overset{\frown}{AB} \cong \overset{\frown}{CD}$ iff $\overline{AB} \cong \overline{DC}$

Example 1:

$x = 60$ (arcs ≅, so chords are ≅ too)

Example 2:

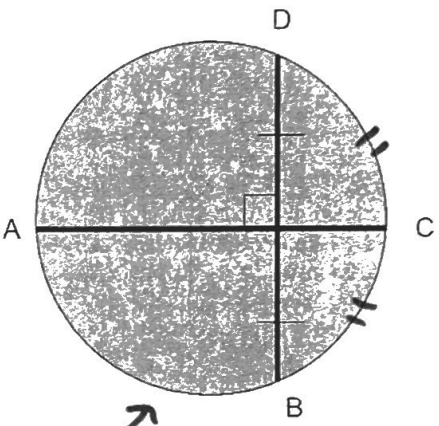


$2x = x + 40$
$-x \quad -x$
$x = 40$

What can you tell me about segment AC if you know it is the perpendicular bisectors of segments DB?

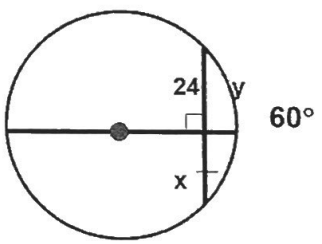
it's the diameter!

Theorem: If one chord is a perpendicular bisector of another chord, then the first chord is a diameter.



Theorem: If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord & its arc.

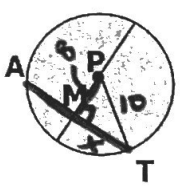
Example:



$x = 24$

$y = 30$

Example: In ⊙P, if $PM \perp AT$, $PT = 10$, & $PM = 8$, Find AT.



* use Pyth. Theorem to find MT.

$8^2 + x^2 = 10^2$

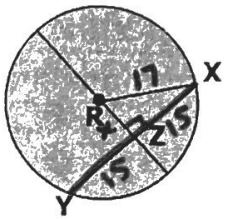
$x = 6.$

$\overline{AM} \cong \overline{MT}$

$6 + 6 = 12$

$AT = 12$

Example: In $\odot R$, $XY = 30$, $RX = 17$ & $RZ \perp XY$. Find RZ.



$x^2 + 15^2 = 17^2$

$x^2 + 225 = 289$

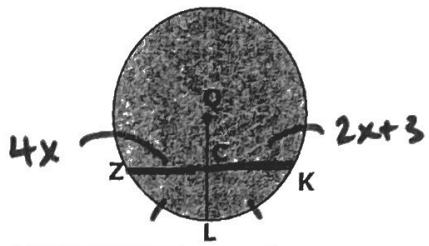
$x^2 = 64$

$x = 8$ $\boxed{RZ = 8}$

Example: In $\odot Q$, $\overset{\frown}{KL} \cong \overset{\frown}{LZ}$.

If $CK = 2x + 3$ & $CZ = 4x$

Find x.



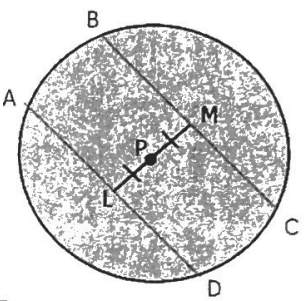
$4x = 2x + 3$

$-2x \quad -2x$

$\frac{2x}{2} = \frac{3}{2}$

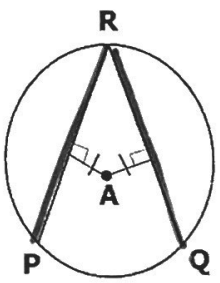
$\boxed{x = \frac{3}{2} \text{ or } 1.5}$

Theorem: In the same circle or in $\cong$ circles, two chords are $\cong$ iff they are equidistant from the center.



$\overline{AD} \cong \overline{BC}$ iff $\overline{LP} \cong \overline{PM}$

Example: In $\odot A$, $PR = 2x + 5$ & $QR = 3x - 27$. Find x



$2x + 5 = 3x - 27$

$-5 \quad -5$

$2x = 3x - 32$

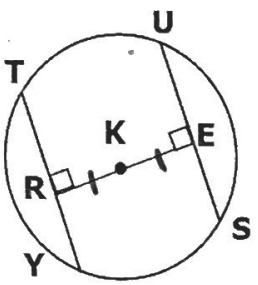
$-3x \quad -3x$

$-x = -32$

$\boxed{x = 32}$

Example:

In $\odot K$, K is the midpoint of $\overline{RE}$. If $TY = -3x + 56$ & $US = 4x$, Find x.



$-3x + 56 = 4x$

$+3x \quad +3x$

$\frac{56}{7} = \frac{7x}{7}$ $\boxed{x = 8}$