Name: Key

ARCS AND CHORDS NOTES (10.3)

THEOREM 10.2

In a circle or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.

Abbreviations:

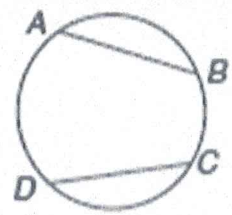
In ⊙, 2 minor arcs are ≅, corr. chords are ≅.

In ⊙, 2 chords are ≅, corr. minor arcs are ≅.

Examples:

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

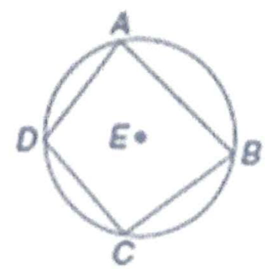
If $\overset{\frown}{AB} \cong \overset{\frown}{CD}$, $\overline{AB} \cong \overline{CD}$.



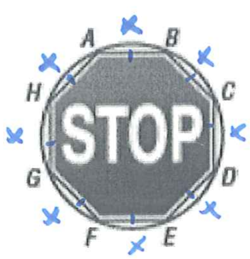
The chords of adjacent arcs can form a polygon.

Quadrilateral ABCD is an inscribed polygon because all of its vertices lie on the circle.

Circle E is circumscribed about the polygon because it contains all the vertices of the polygon.



Let's see some examples:

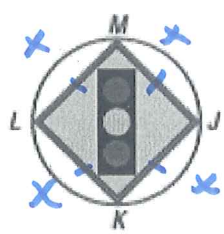


$8x = 360$

$x = \frac{360}{8}$

$\boxed{x = 45°}$

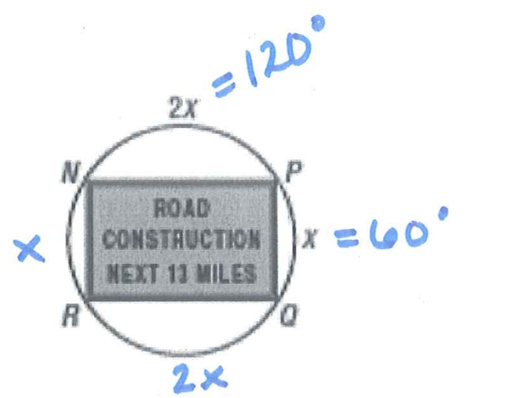
square



$4x = 360$

$x = \frac{360}{4}$

$\boxed{x = 90°}$



$2x + x + 2x + x = 360$

$6x = 360$

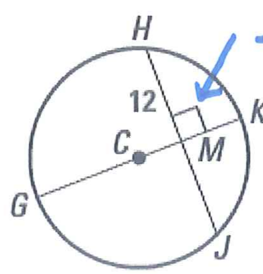
$\boxed{x = 60°}$

Key Concept!

Theorem:
In a circle, if a diameter (or radius) is perpendicular to a chord, then it <u>*BISECTS*</u> *the chord and its arc.*

With your shoulder partner, define the word ***bisect*** and write it down: to cut a segment into 2 $\cong$ parts.

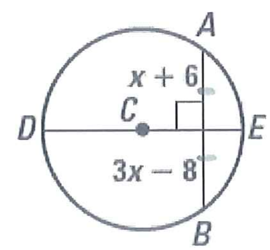
1. Find the length of $\overline{JM}$.



$\perp$ to radius or diameter! So Chord HJ is bisected.

$\overline{JM} = 12$

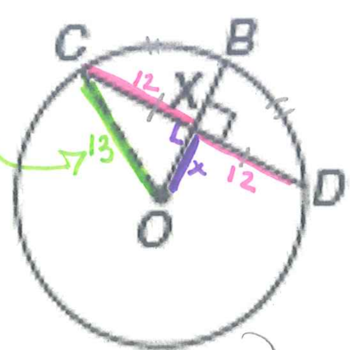
2. Find x.



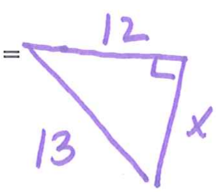
$x + 6 = 3x - 8$
$-x \qquad -x$
$6 = 2x - 8$
$+8 \qquad +8$
$14 = 2x$
$\boxed{7 = x}$

Example 3: Given the information below, find CX, OX, XB, and the $m\widehat{CD}$.

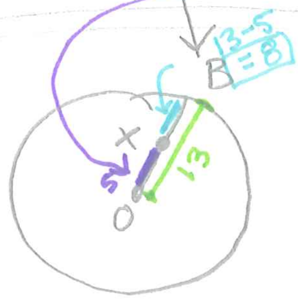
Circle O has a radius of 13 inches. Radius $\overline{OB}$ is perpendicular to chord $\overline{CD}$, which is 24 inches long.



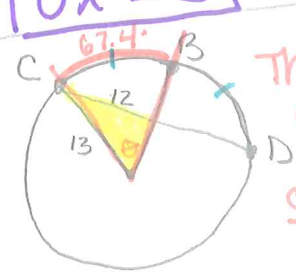
CX = $\frac{1}{2}24 \boxed{= 12}$

OX = 

$x^2 + 12^2 = 13^2$
$x^2 + 144 = 169$
$x^2 = 25$
$\boxed{OX = 5}$

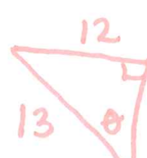


$\boxed{XB = 8}$



The measure of the arc is the same as the central ∠.

$m\widehat{CBD} =$



$\sin\theta = \frac{12}{13}$

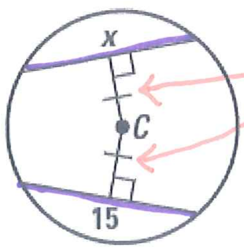
$\theta = \sin^{-1}\left(\frac{12}{13}\right) \quad \theta = 67.4°$

$67.4 + 67.4$

$\boxed{134.8°}$

In a circle or in congruent circles, two chords are congruent if and only if they are equidistant from the center.

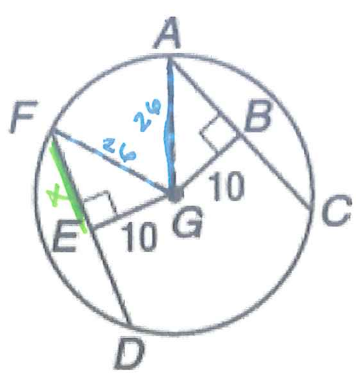
Example 4: Find x.



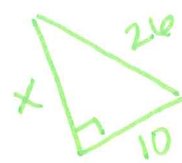
equidistant from the center so the chords are $\cong$

$X = 15$

Example 5: Chords $\overline{AC}$ *and* $\overline{DF}$ are equidistant from the center. If the radius of Circle G is 26m, find FE, DE, AB and AC.



FE =



$x^2 + 10^2 = 26^2$

$x^2 + 100 = 676$

$x^2 = 576$

$\boxed{x = 24}$

FE = 24

DE= 24

AB = 24

AC= $2 \cdot 24$

AC = 48