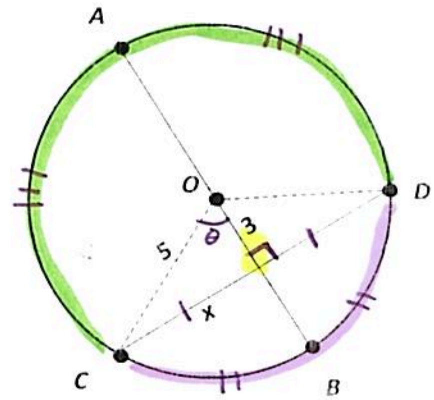
PAP Geometry Notes
Chapter 11 - Circles

Name: Key

11.4 - Chords

** A **chord** is a line segment with each endpoint on the circle. **



The **Diameter--Chord Theorem** states that if a circle's diameter is perpendicular to a chord, then the diameter bisects the chord and bisects the arc determined by the chord.

Find x, $m\overline{CD}$, and $m\widehat{CD}$.

(hint: you need a central angle to find the arc, *use trigonometry*)

$5^2 - 3^2 = x^2$ $\quad x = 4$

$\overline{CD} = 8$

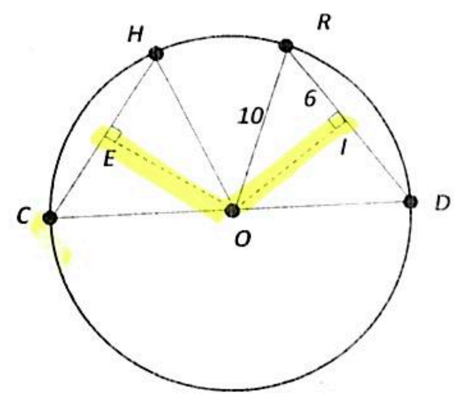
$\sin\theta = \frac{O}{H}$

$\sin\theta = \frac{4}{5}$

$\sin^{-1}\left(\frac{4}{5}\right) = \theta = 53.13°$

$\widehat{CB} = 53.13°$

$\widehat{CD} = 106.26°$



The **Equidistant Chord Theorem** states that if two chords of the same circle or congruent circles are congruent, then they are equidistant from the center of the circle.

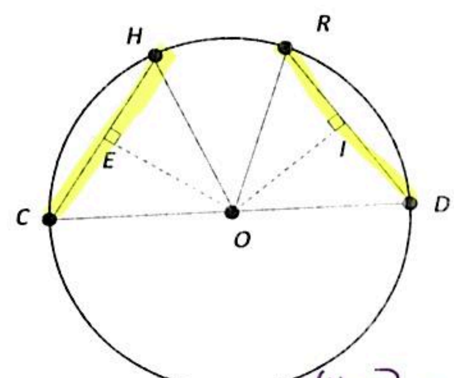
In circle O, chords $\overline{CH}$ and $\overline{RD}$ are congruent.

Find $\overline{EO}$.

$10^2 - 6^2 = \overline{IO}^2$

$\overline{IO} = 8 \quad \overline{EO} = 8$

The **Equidistant Chord Converse Theorem** states that if two chords of the same circle or congruent circles are equidistant from the center of the circle, then the chords are congruent.



In circle O, $\overline{EO} = 12$ and $\overline{IO} = 12$.

What can you conclude about chords $\overline{CH}$ and $\overline{RD}$?

the chords are $\cong$

* Congruent-chord congruent-arc theorem: if two chords are $\cong \xrightarrow{\text{(then)}}$ their corresponding arcs are $\cong$

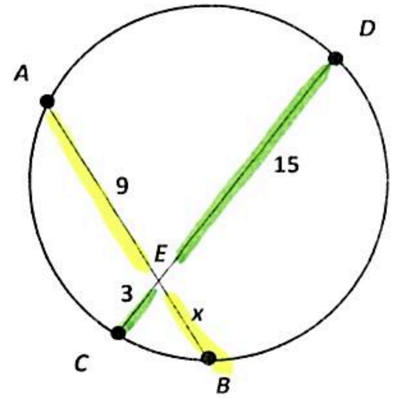
* Congruent-chord congruent-arc Converse theorem: if two arcs are $\cong \xrightarrow{\text{(then)}}$ their corresponding chords are $\cong$

Segments of chord are the segments formed on a chord when two chords of a circle intersect.

**name the segments of each chord created below.

$AB \rightarrow \boxed{\overline{AE} \quad \overline{EB}}$ $\quad \overline{DC} \rightarrow \boxed{\overline{CE} \quad \overline{ED}}$

The **Segments—Chord Theorem** states that if two chords in a circle intersect, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the second chord.



Find x.

$\overline{AE} \times \overline{EB} = \overline{CE} \times \overline{ED}$

$9x = 3(15)$

$9x = 45$

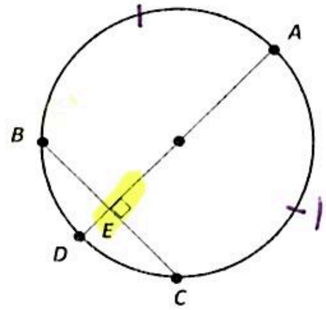
$x = 5$

Use the theorems involving circles to solve the example problems:

1. Find $m\widehat{BC}$.

150

$m\widehat{AC} = 150°$



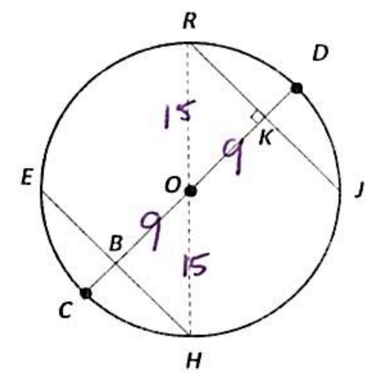
150

$360 - 300 =$

60

$\widehat{BC} = 60°$

2. Find $m\overline{EH}$.



$m\overline{OB} = 9$

$m\overline{OK} = 9$

$m\overline{RH} = 30$

$15^2 - 9^2 = \overline{RK}^2$

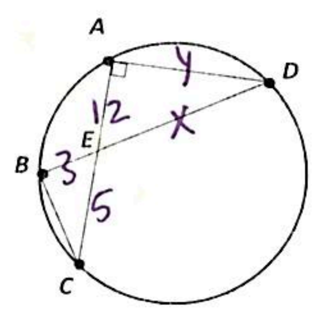
$\overline{RK} = 12$

$\overline{RJ} = 24$

$\overline{EH} = 24$

3. Find $m\overline{AD}$.

$m\overline{AE} = 12$
$m\overline{BE} = 3$
$m\overline{EC} = 5$



$12(5) = 3x$

$x = 20$

$20^2 - 12^2 = \overline{AD}^2$ $\quad \overline{AD} = 16$