1. Use the diagram to answer the following:

Circle: $\odot C$

Center: C

Diameter: $\overline{BV}$

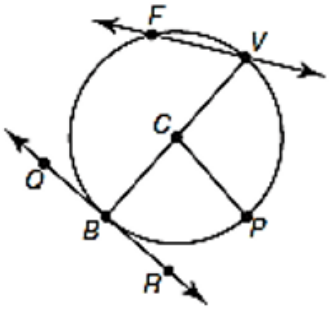
All Chords: $\overline{FV}$, $\overline{BV}$

Point of Tangency: B

Tangent: $\overleftrightarrow{QR}$

Secant: $\overleftrightarrow{FV}$

All Radii: $\overline{CV}$, $\overline{BC}$, $\overline{PC}$



2. Identify and name each of the following. Be sure to use the correct notation.

a. Two different central angles $\angle DOC$, $\angle BOC$, $\angle AOB$, $\angle AOD$

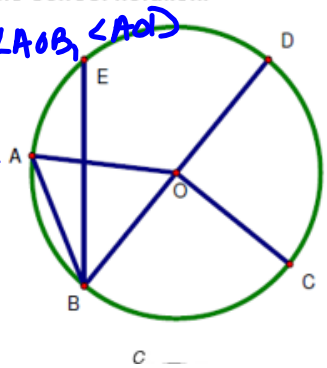
b. A minor arc $\overset{\frown}{AB}$, $\overset{\frown}{AD}$, $\overset{\frown}{DC}$, $\overset{\frown}{BC}$

c. A major arc $\overset{\frown}{ADC}$, $\overset{\frown}{ABD}$, $\overset{\frown}{ACD}$, $\overset{\frown}{CDA}$

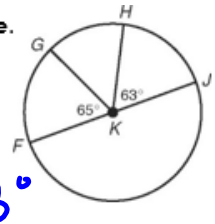
d. A semicircle $\overset{\frown}{BCD}$ $\overset{\frown}{BED}$

e. Two different chords $\overline{BE}$, $\overline{BD}$, $\overline{AB}$

f. The central angle subtended by $\overset{\frown}{AD}$ $\angle AOD$

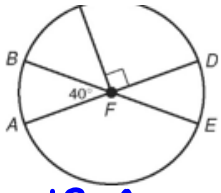


Find each measure.



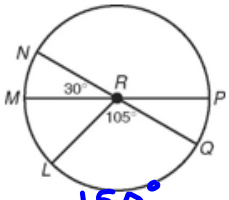
3. $m\widehat{HJ}$ 63°

4. $m\widehat{FHG}$ 295°



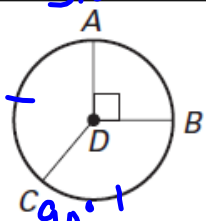
5. $m\widehat{CE}$ 130°

6. $m\widehat{BDC}$ 310°



7. $m\widehat{NP}$ 150°

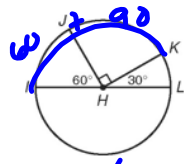
8. $m\widehat{LNP}$ 225°



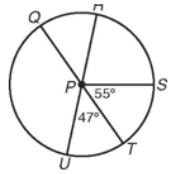
9. $m\widehat{AB}$ 90°

10. $m\widehat{ACB}$ 270°

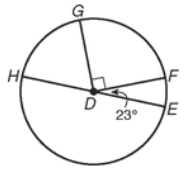
11. $m\widehat{CA}$ 135°



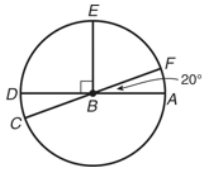
12. $m\widehat{LK}$ 30° , $m\widehat{IK}$ 150°



13. $m\widehat{QS}$ 125° , $m\widehat{RQT}$ 227°



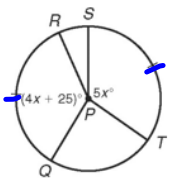
14. $m\widehat{HG}$ 67° , $m\widehat{FEH}$ 203°



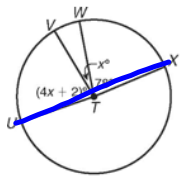
15. $m\widehat{EF}$ 70° , $m\widehat{CEA}$ 200°

$4x+2+x+78=180$

$4x+25=5x$
$-4x \quad -4x$
$25=x$



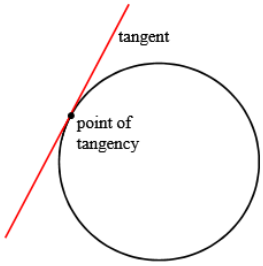
16. $\angle QPR$ 125°



17. $\angle UTW$ 102° , $m\widehat{UV}$ 82°

Tangents in a Circle

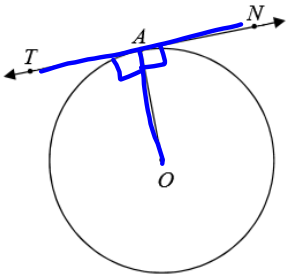
Tangents

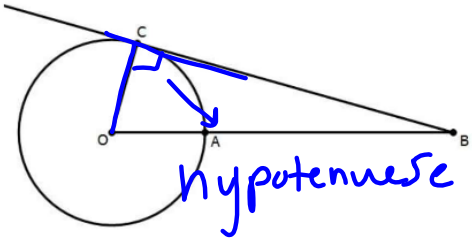


Remember a *tangent to a circle* is a line (in the plane of the circle) that

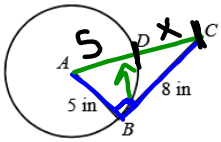
intersects the circle at exactly 1 point.

Theorem: When a tangent and a radius intersects on a circle the two lines are perpendicular





Example 1: *CB* is tangent to the circle. Find the length of segment *CD*.



$5^2 + 8^2 = AC^2$

$25 + 64 = AC^2$

$\sqrt{89} = \sqrt{AC^2}$

$9.4 = AC$

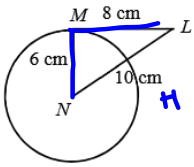
$AD + CD = AC$

$5 + CD = 9.4$

$-5 \qquad -5$

$\boxed{CD = 4.4}$

Example 2: Determine whether *LM* is a tangent to the circle.



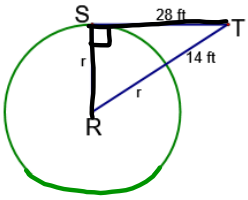
$6^2 + 8^2 = 10^2$

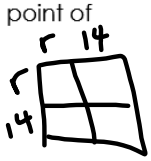
$36 + 64 = 100$

$100 = 100$ ✓

Yes, LM is tangent.

Example 3: You are standing 14 feet from a water tower. The distance from you to a point of tangency on the tower is 28 feet. What is the radius of the water tower?





$28^2 + r^2 = (r+14)^2$

$784 + r^2 = (r+14)(r+14)$

$784 + r^2 = r^2 + 14r + 14r + 196$

$784 + \cancel{r^2} = \cancel{r^2} + 28r + 196$

$-r^2 \qquad -r^2$

$784 = 28r + 196$

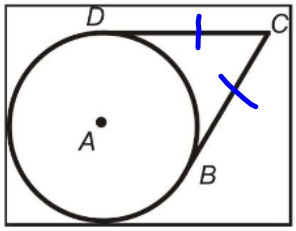
$784 = 28r + 196$

$-196 \qquad -196$

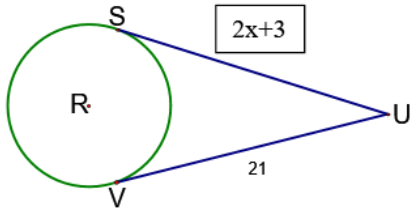
$\frac{588}{28} = \frac{28r}{28}$

$21\text{ft} = r$

Theorem: Two tangent segments drawn to a circle from the same external point are congruent. In diagram below, DC = CB.

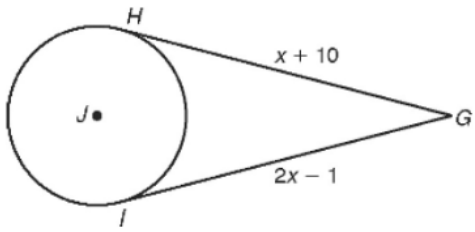


Example 4: $\overline{US}$ is tangent to circle R at point S. $\overline{UV}$ is tangent to circle R at point V. Find the value of x.



$2x+3=21$
$-3 \quad -3$
$\frac{2x}{2}=\frac{18}{2}$
$\boxed{x=9}$

Example 5: $\overline{HG}$ is tangent to circle J at point H. $\overline{IG}$ is tangent to circle J at point I. Find the value of x.

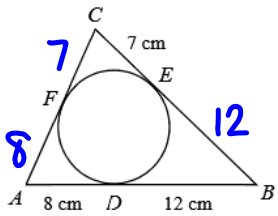


$x+10=2x-1$
$-x \quad -x$
$10=x-1$
$+1 \quad +1$
$11=x$

Find IG

$IG=2x-1$
$IG=2(11)-1$
$IG=21$

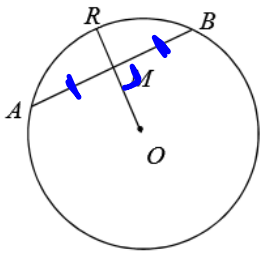
Example 6: Find the perimeter of the triangle.



$7+7+12+12+8+8=P$

$\boxed{54\text{cm}=P}$

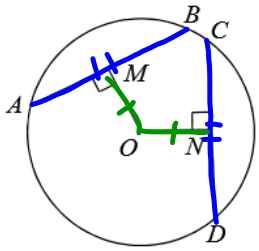
Theorem: If a radius (or diameter) is perpendicular to a chord, then it bisects the chord, and conversely.



If $\overline{OR} \perp \overline{AB}$, then $\overline{OR}$ bisects $\overline{AB}$ (AM = MB).

If $\overline{OR}$ bisects $\overline{AB}$ (AM = MB), then $\overline{OR} \perp \overline{AB}$.

Theorem: If two chords of a circle are equidistant from the center, then they are ***CONGRUENT***, and conversely.

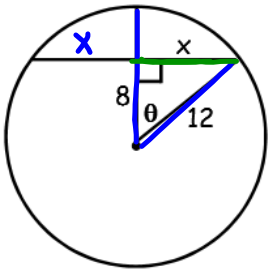


If OM = ON, then AB = CD.

If AB = CD, then OM = ON.

Ex: In circle O with radius 12, chord $\overline{AB}$ is 8 units from O.

a. What is the length of the chord?



$x^2 + 8^2 = 12^2$

$x^2 + 64 = 144$

$-64 \quad -64$

$\sqrt{x^2} = \sqrt{80}$

$x = 8.9$

$8.9 + 8.9$

Chord = 17.8