

Name

Adv Geo -

Ms. Kresovic

T 16 Apr 13

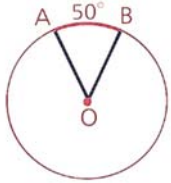
10-5: Angles Relates to a Circle

Objectives

After studying this section, you will be able to

- Determine the measures of central angles
- Determine the measures of inscribed and tangent-chord angles
- Determine the measures of chord-chord angles
- Determine the measures of secant-secant, secant-tangent, and tangent-tangent angles

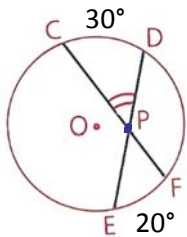
When the vertex of the angle is the CENTER of the circle



$$m \text{ central } \angle = m \text{ arc}$$

$$\angle AOB = \widehat{AB} = 50^\circ$$

When the vertex of the angle is IN the circle (but not the center) $\angle = \frac{m + n}{2}$



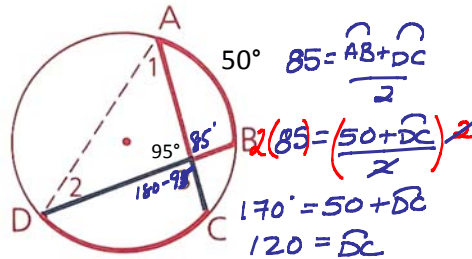
$$\angle CPD = \frac{\widehat{CD} + \widehat{EF}}{2}$$

$$= \frac{30 + 20}{2}$$

$$= \frac{50}{2}$$

$$\angle CPD = 25^\circ$$

chord-chord or
sec - sec angles



$$85 = \frac{\widehat{AC} + \widehat{DC}}{2}$$

$$85 = \frac{50 + \widehat{DC}}{2}$$

$$170 = 50 + \widehat{DC}$$

$$120 = \widehat{DC}$$

Notes: Vertical angles are congruent. The angle measure is the AVERAGE of the arcs.

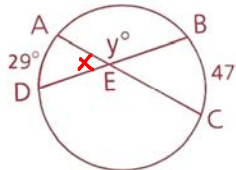
If a trend is IN, then it's perceived as a positive. (Add the angles.)

Problem 2

Find y.

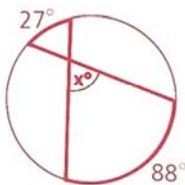
$$x = \frac{29 + 47}{2} = \frac{76}{2} = 38^\circ$$

$$\frac{180^\circ - 38^\circ}{2} = y$$



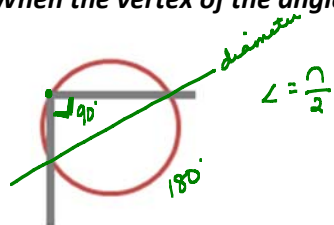
Problem 3

a Find x.

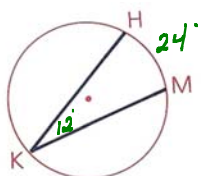


$$x = \frac{88 + 27}{2} = \frac{115}{2} = 57.5^\circ$$

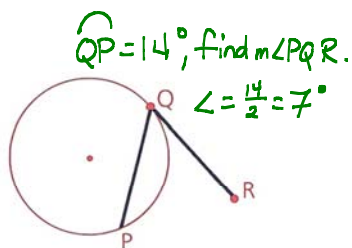
When the vertex of the angle is ON the circle



Remember the Carpenter's trick.



$\angle HKM$ is an *inscribed angle*.



$\angle PQR$ is a *tangent-chord angle*.

sec-sec:

Example 1

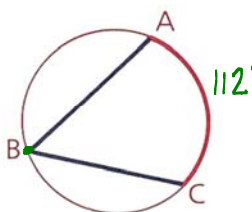
Given: $m\widehat{AC} = 112$

Find: $m\angle B$

$$m\angle B = \frac{1}{2}(m\widehat{AC})$$

$$= \frac{1}{2}(112)$$

$$= 56^\circ$$



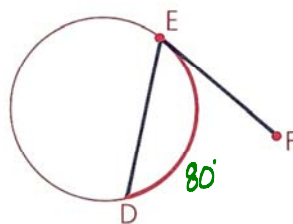
tan-chord:

Example 2

Given: \overline{FE} is tangent at E.

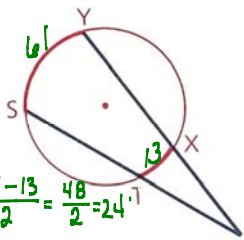
$m\widehat{DE} = 80$

Find: $m\angle DEF = 40^\circ$

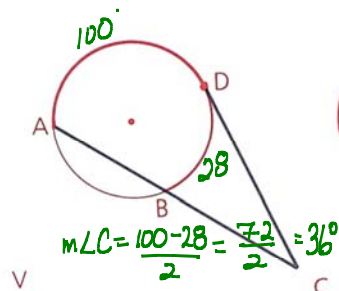


When the vertex of the angle is OUT of the circle

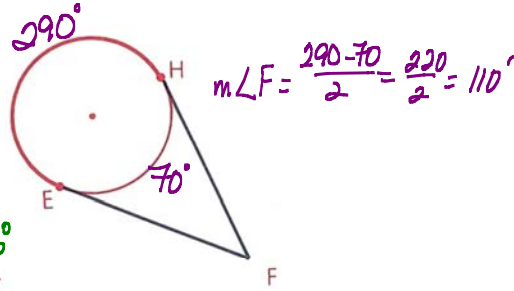
$$\angle = \frac{\text{arc}}{2}$$



$\angle V$ is a
secant-secant angle.



$\angle C$ is a
secant-tangent angle.



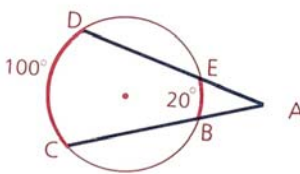
$\angle F$ is a
tangent-tangent angle.

Note: If a trend is OUT, then it's perceived as a negative. (Subtract the angles.)

Example 1 Find $m\angle A$.

$$m\angle A = \frac{1}{2}(m\widehat{CD} - m\widehat{BE})$$

$$m\angle A = \frac{100 - 20}{2} = \frac{80}{2} = 40^\circ$$

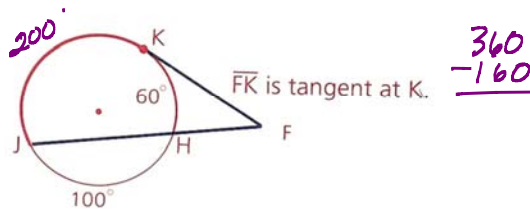


Example 2 Find $m\angle F$.

$$m\angle F = \frac{200 - 60}{2}$$

$$= \frac{140}{2}$$

$$= 70^\circ$$

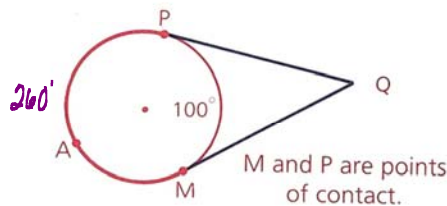


Example 3 Find $m\angle Q$.

$$= \frac{260 - 100}{2}$$

$$= \frac{160}{2}$$

$$= 80^\circ$$

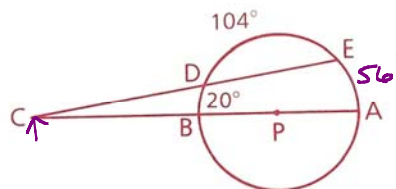


Problem 1 Given: \overline{AB} is a diameter of $\odot P$.

$\widehat{BD} = 20^\circ$, $\widehat{DE} = 104^\circ$

Find: $m\angle C$

$$m\angle C = \frac{56 - 20}{2} = \frac{36}{2} = 18^\circ$$



$$\widehat{BD} + \widehat{DE} + \widehat{EA} = \text{semicircle}$$

$$104 + 20 + \widehat{EA} = 180$$

$$-124 \quad -124$$

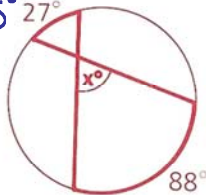
$$\widehat{EA} = 56^\circ$$

Mixed Practice

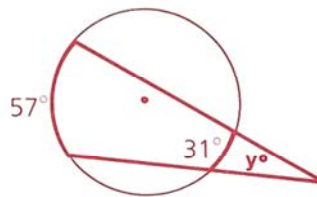
Problem 3

a Find x.

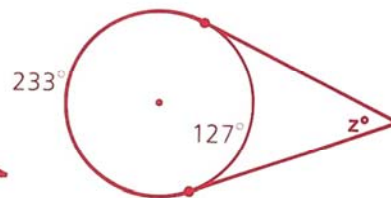
$$x = \frac{27 + 88}{2} = \frac{115}{2} = 57.5^\circ$$



b Find y.



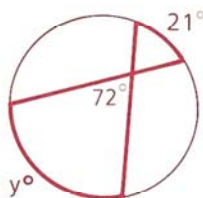
c Find z.



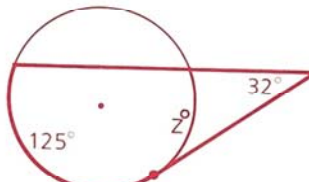
Problem 4

a Find y.

$$\begin{aligned} 72 &= \frac{y+21}{2} \\ 144 &= y+21 \\ 123 &= y \end{aligned}$$



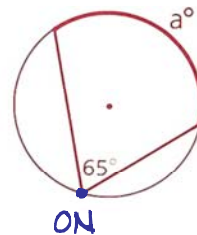
b Find z.



$$32 = \frac{125 - z}{2}$$

$$\begin{aligned} 64 &= 125 - z \\ -64 + z &= -64 + z \\ z &= 61^\circ \end{aligned}$$

c Find a.



$$\begin{aligned} \angle &= \frac{n}{2} \\ 65 &= \frac{a}{2} \\ 130 &= a \end{aligned}$$

Problem 5

Find $m\widehat{AB}$ and $m\widehat{CD}$.

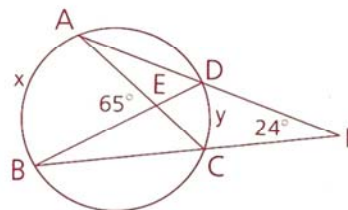
$$65 = \frac{x+y}{2} \quad \& \quad 24 = \frac{x-y}{2}$$

$$130 = x+y \quad \& \quad 48 = x-y$$

$$\begin{cases} x+y = 130 \\ x-y = 48 \end{cases}$$

$$2x = 178$$

$$x = 89. \text{ If } x = 89, 89+y = 130, y = 41^\circ$$



Summary

If the vertex of the angle is ____ the circle	Then use this formula to find the angle's measure:
IN $\Rightarrow +$	$\angle = \frac{n+n}{2} \rightarrow \text{angle} = \frac{\text{arc} + \text{arc}}{2}$
ON	$\angle = \frac{n}{2} \rightarrow \text{angle} = \frac{\text{arc}}{2}$
OUT $\Rightarrow -$	$\angle = \frac{n-n}{2} \rightarrow \text{angle} = \frac{\text{arc} - \text{arc}}{2}$

Name _____

Adv Geo -

Ms. Kresovic

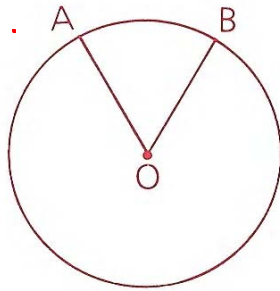
T 16 Apr 13

10-5: Angles Relates to a Circle

1 Vertex at center:

Given: $\widehat{AB} = 62^\circ$

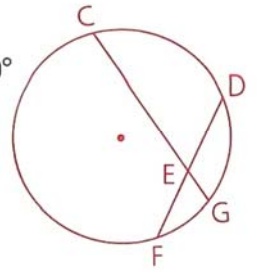
Find: $m\angle O$



2 Vertex inside:

Given: $\widehat{CD} = 100^\circ$, $\widehat{FG} = 30^\circ$

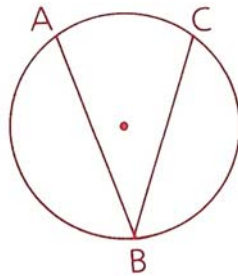
Find: $m\angle CED$



3 Vertex on:

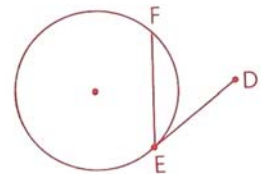
a Given: $\widehat{AC} = 70^\circ$

Find: $m\angle B$

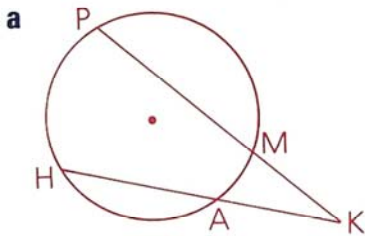


b Given: \overline{DE} is tangent at E.
 $\widehat{EF} = 150^\circ$

Find: $m\angle DEF$

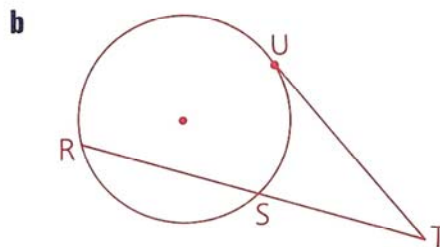


4 Vertex outside:



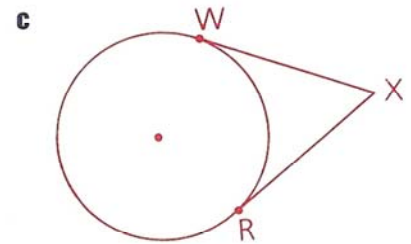
Given: $\widehat{HP} = 120^\circ$,
 $\widehat{AM} = 36^\circ$

Find: $m\angle K$



Given: \overline{TU} is tangent at U.
 $\widehat{RU} = 160^\circ$,
 $\widehat{SU} = 60^\circ$

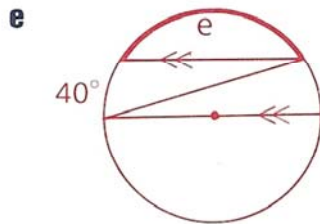
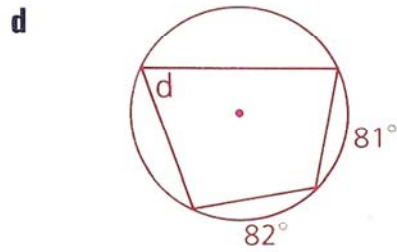
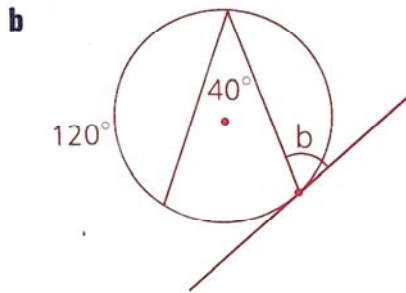
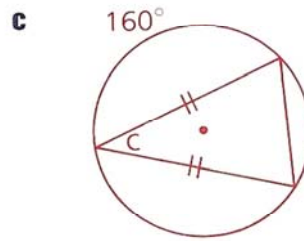
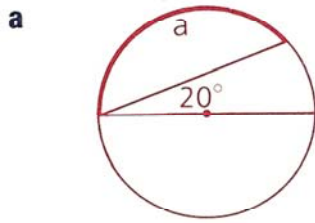
Find: $m\angle T$



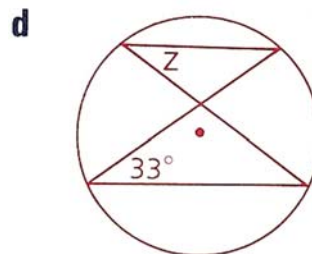
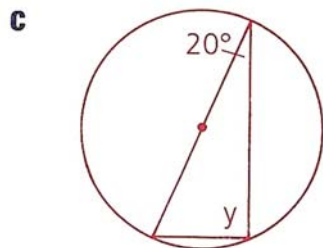
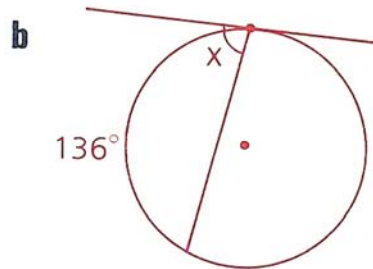
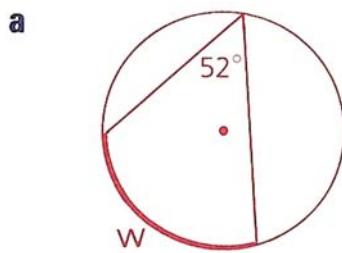
Given: W and R are points of contact.
 $\widehat{WR} = 140^\circ$

Find: $m\angle X$

5 Find the measure of each angle or arc that is labeled with a letter.

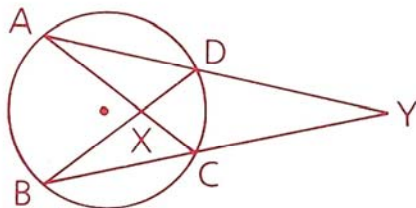


6 Find the measure of each angle or arc that is labeled with a letter.



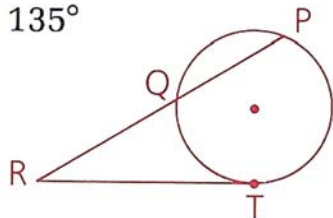
- 7 Given: $\widehat{AB} = 108^\circ$, $\widehat{CD} = 62^\circ$

Find: $\angle AXB$ and $\angle Y$



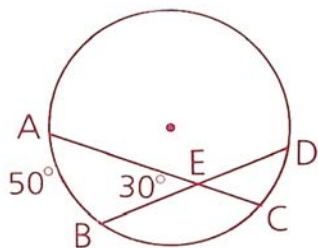
- 8 Given: $\widehat{TP} = 170^\circ$, $\widehat{PQ} = 135^\circ$

Find: $\angle R$



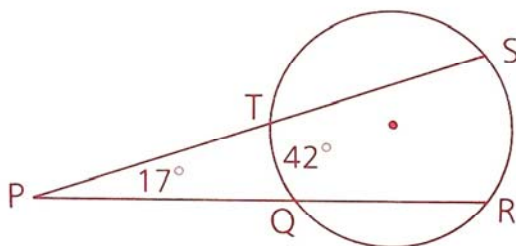
- 9 Given: $\angle AEB = 30^\circ$,
 $\widehat{AB} = 50^\circ$

Find: \widehat{CD}

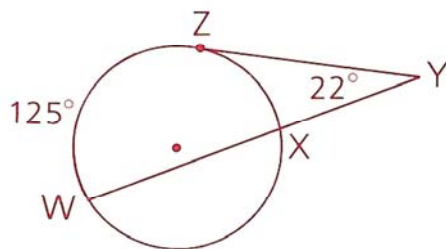


- 10 Given: $\angle P = 17^\circ$,
 $\widehat{TQ} = 42^\circ$

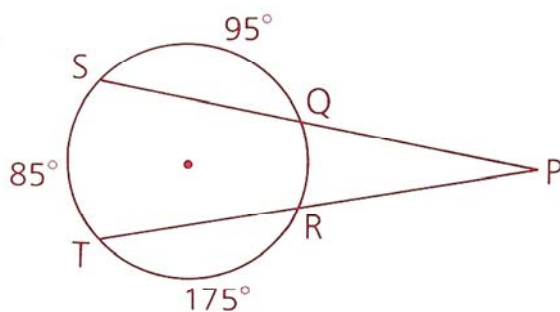
Find: \widehat{SR}



- 11 If $\angle Y = 22^\circ$, $\widehat{WZ} = 125^\circ$, and \overleftrightarrow{YZ} is tangent at Z, find \widehat{XZ} .

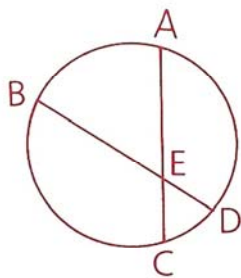


- 12 If $\widehat{ST} = 85^\circ$, $\widehat{SQ} = 95^\circ$, and $\widehat{TR} = 175^\circ$, find $\angle P$.



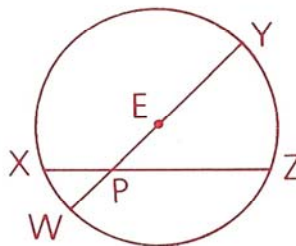
- 13 Given: $\widehat{AB} = 85^\circ$,
 $\widehat{CD} = 25^\circ$

Find: $\angle AED$



- 14 Given: \overline{WY} is a diameter of $\odot E$.
 $\widehat{WX} = 50^\circ$, $\angle XPY = 120^\circ$

Find: \widehat{WZ}



- 15 A circle is divided into three arcs in the ratio of 3:4:5. A tangent-chord angle intercepts the largest of the three arcs. Find the measure of the tangent-chord angle.

- 16 An inscribed angle intercepts an arc that is $\frac{1}{9}$ of the circle. Find the measure of the inscribed angle.

- 17 If a point is chosen at random on $\odot M$, what is the probability that it lies on

a \widehat{IAN} b \widehat{AN} c \widehat{ID} d \widehat{IE}

