Name Ms. Kresovic

Adv Geo - T 16 Apr 13

10-5: Angles Relates to a Circle

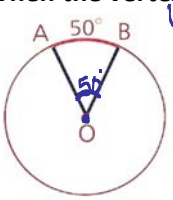
Objectives

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

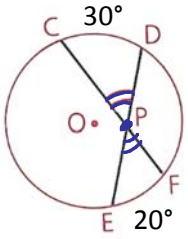
When the vertex of the angle is the CENTER of the circle

↳ point of 2 rays, such as O



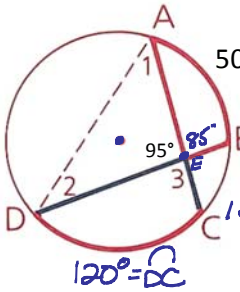
m central ∠ = m arc

When the vertex of the angle is IN the circle (but not the center)



$\angle = \frac{\cap + \cap}{2}$

$m\angle CPD = \frac{30+20}{2} = \frac{50}{2} = 25°$



$m\angle AEB = 180 - 95$

$85 = \frac{50 + \overset{\frown}{DC}}{2}$

$170 = 50 + \overset{\frown}{DC}$

$120° = \overset{\frown}{DC}$

$120° = \overset{\cap}{DC}$

chord-chord or

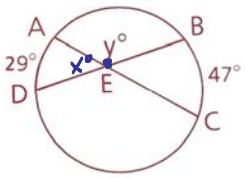
sec – sec angles

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.

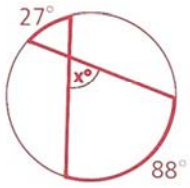
x + y are supp



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

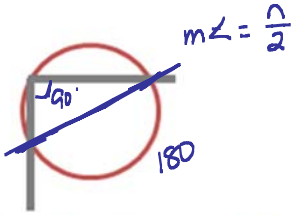
then $y = 180 - 38 = 142°$

Problem 3 **a** Find x.

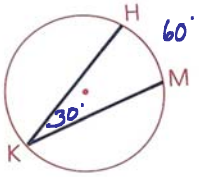


$x = \frac{27+88}{2} = \frac{115}{2} = 57.5°$

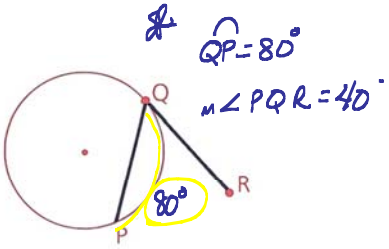
When the vertex of the angle is <u>ON</u> the circle



Remember the Carpenter's trick.



∠HKM is an ***inscribed angle.***



$\overset{\frown}{QP} = 80°$

$m\angle PQR = 40°$

∠PQR is a ***tangent-chord angle.***

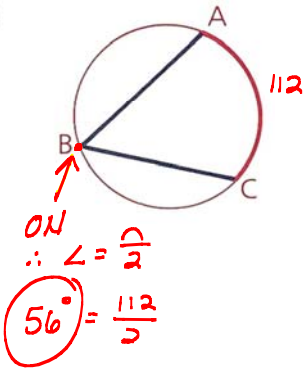
sec-sec:

Example 1

Given: $m\overset{\frown}{AC} = 112$

Find: $m\angle B$

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



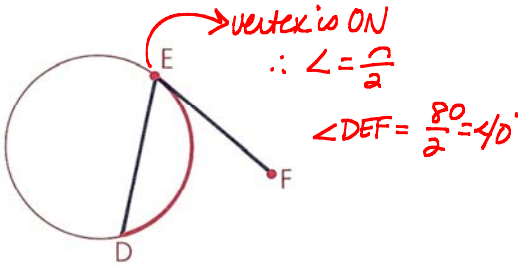
tan-chord:

Example 2

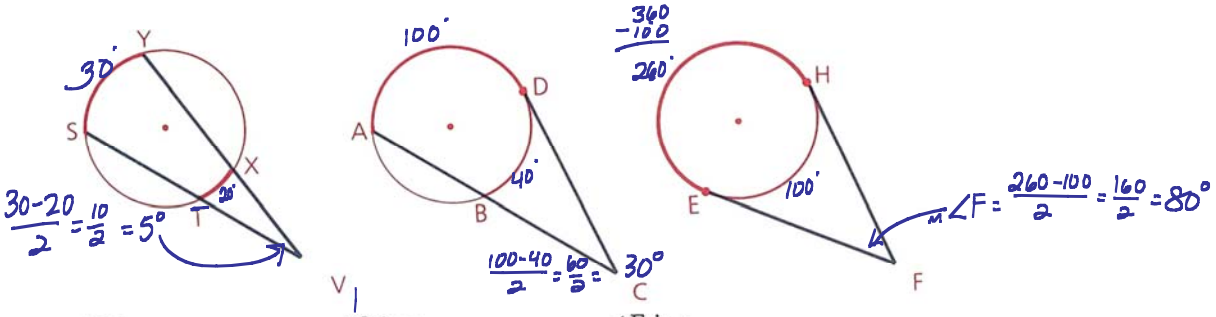
Given: $\overline{FE}$ *is tangent at* E.

$m\overset{\frown}{DE} = 80$

Find: $m\angle DEF$



When the vertex of the angle is <u>OUT</u> of the circle $\angle = \frac{\text{big arc} - \text{small arc}}{2}$



∠V is a ***secant-secant angle.***

∠C is a ***secant-tangent angle.***

∠F is a ***tangent-tangent angle.***

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

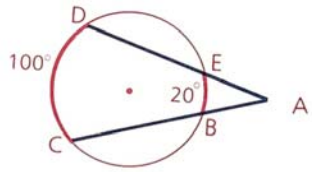
Example 1 Find m∠A.

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

$= \frac{1}{2}(100 - 20)$

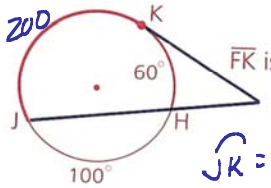
$= \frac{1}{2}(80)$

$= 40$



Example 2 Find m∠F.

$\angle F = \frac{200-60}{2} = \frac{140}{2} = 70°$

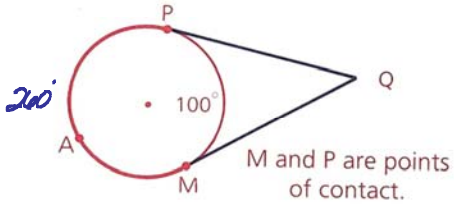


$\overline{FK}$ is tangent at K.

$\overset{\frown}{JK} = 360 - 160 = 200$

Example 3 Find m∠Q.

$\frac{260-100}{2} = \frac{160}{2} = 80°$

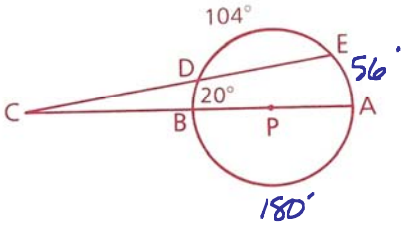


M and P are points of contact.

Problem 1 Given: $\overline{AB}$ is a diameter of ⊙P.
$\overset{\frown}{BD} = 20°$, $\overset{\frown}{DE} = 104°$

Find: m∠C

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



$\overset{\frown}{BD} + \overset{\frown}{DE} + \overset{\frown}{EA}$ = semicircle

$20 + 104 + \overset{\frown}{EA} = 180°$

$\overset{\frown}{EA} = 56°$

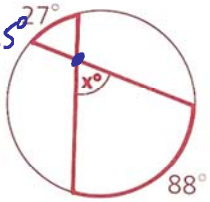
Mixed Practice

Problem 3

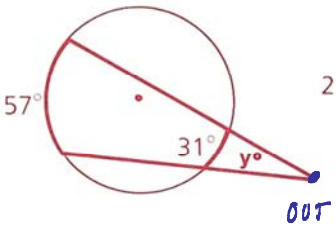
a *Find x.*

$\frac{27+88}{2} = \frac{115}{2} = 57.5°$

IN

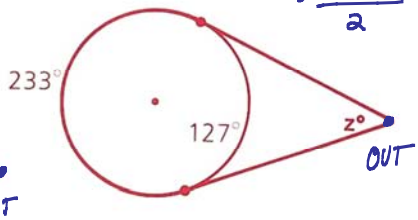


b *Find y.* $\frac{57+31}{2} = \frac{26}{2} = 13°$



OUT

c *Find z.* $\frac{233-127}{2} = \frac{106}{2} = 53°$



OUT

Problem 4

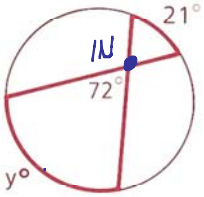
a *Find y.*

$2 \cdot \frac{21+y}{2} = 72° \cdot 2$

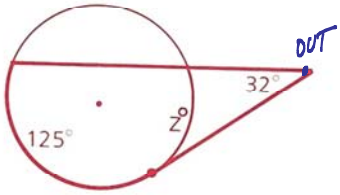
$21+y = 144°$

$-21 \quad -21$

$y = 123°$



b *Find z.*



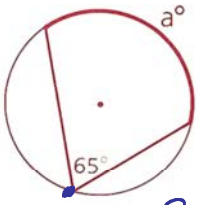
$2 \cdot \frac{125-z}{2} = 32° \cdot 2$

$125 - z = 64$

$-64 + z \quad -64 + z$

$61° = z$

c *Find a.*



ON $\angle = \frac{a}{2}$

$65 = \frac{a}{2}$

$130° = a$

Problem 5 *Find* $\overset{\frown}{mAB}$ *and* $\overset{\frown}{mCD}$.

$\overset{\frown}{mAB}: \frac{x-y}{2} = 24$

$x - y = 48$

$\overset{\frown}{mCD}: \frac{x+y}{2} = 65$

$x + y = 130$

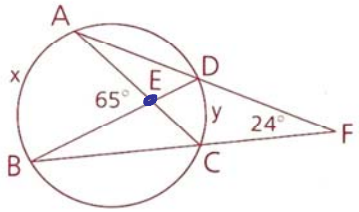
linear system $\begin{cases} x-y=48 \\ x+y=130 \end{cases}$

$2x = 178°$

$x = 89°$

If $x = 89$ then $89 + y = 130$

$y = 41°$



Summary

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

Name

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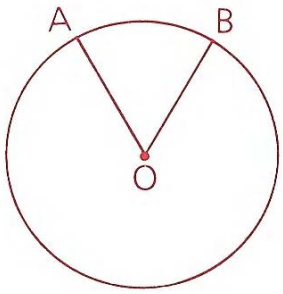
T 16 Apr 13

10-5: Angles Relates to a Circle

1 *Vertex at center:*

Given: $\overset{\frown}{AB} = 62°$

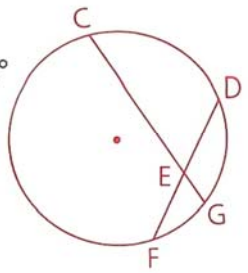
Find: $m\angle O$



2 *Vertex inside:*

Given: $\overset{\frown}{CD} = 100°$, $\overset{\frown}{FG} = 30°$

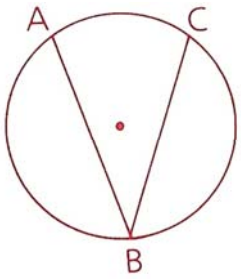
Find: $m\angle CED$



3 *Vertex on:*

a Given: $\overset{\frown}{AC} = 70°$

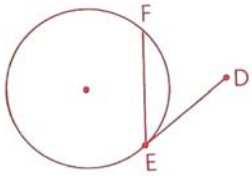
Find: $m\angle B$



b Given: $\overline{DE}$ is tangent at E.

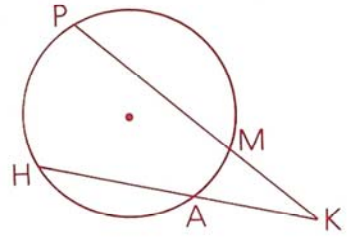
$\overset{\frown}{EF} = 150°$

Find: $m\angle DEF$



4 *Vertex outside:*

a

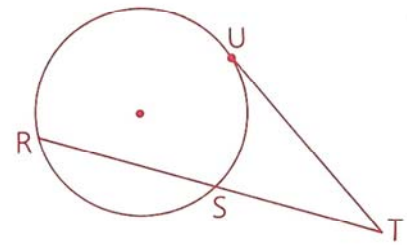


Given: $\overset{\frown}{HP} = 120°$,

$\overset{\frown}{AM} = 36°$

Find: $m\angle K$

b



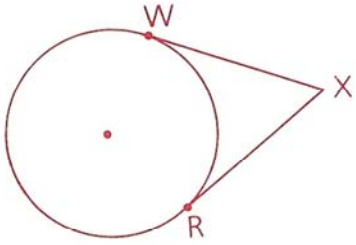
Given: $\overline{TU}$ is tangent at U.

$\overset{\frown}{RU} = 160°$,

$\overset{\frown}{SU} = 60°$

Find: $m\angle T$

c



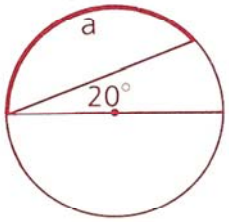
Given: W and R are points of contact.

$\overset{\frown}{WR} = 140°$

Find: $m\angle X$

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

a



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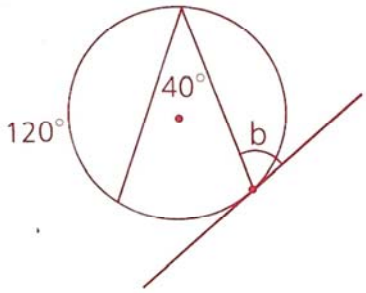

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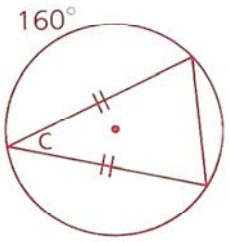
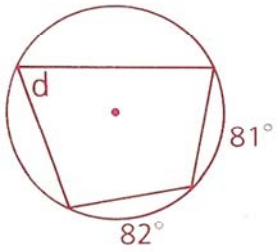
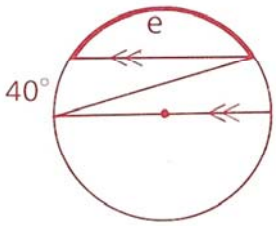


d

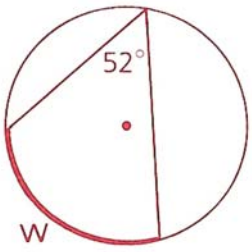


e



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

a



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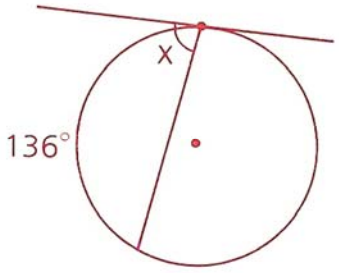

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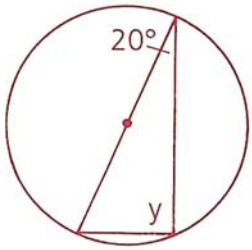

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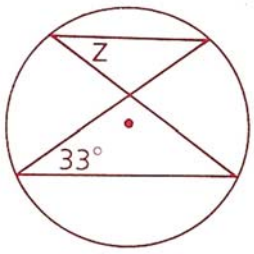
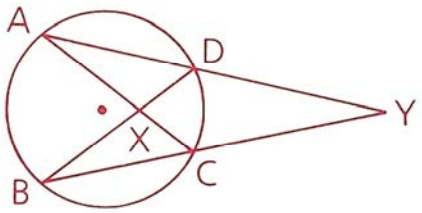
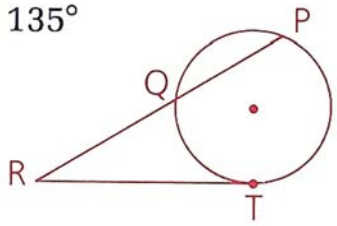


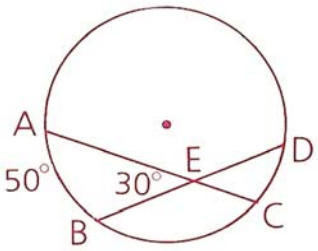
7 Given: $\overset{\frown}{AB} = 108°$, $\overset{\frown}{CD} = 62°$
Find: $\angle AXB$ and $\angle Y$



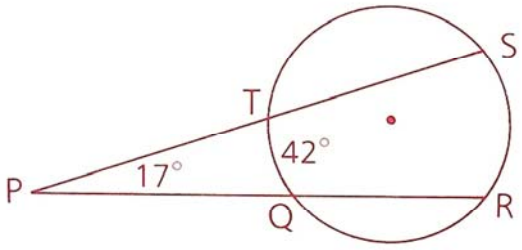
8 Given: $\overset{\frown}{TP} = 170°$, $\overset{\frown}{PQ} = 135°$
Find: $\angle R$



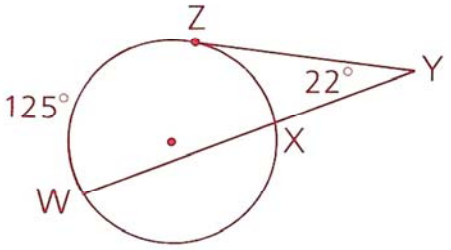
9 Given: $\angle AEB = 30°$,
$\overset{\frown}{AB} = 50°$
Find: $\overset{\frown}{CD}$



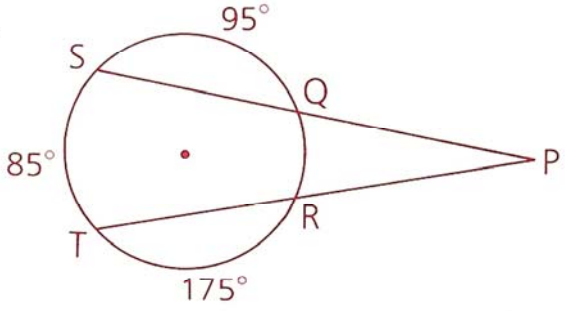
10 Given: $\angle P = 17°$,
$\overset{\frown}{TQ} = 42°$
Find: $\overset{\frown}{SR}$



11 If $\angle Y = 22°$, $\overset{\frown}{WZ} = 125°$, and $\overleftrightarrow{YZ}$ is tangent at Z, find $\overset{\frown}{XZ}$.

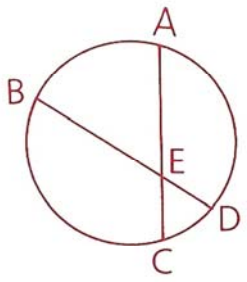


12 If $\overset{\frown}{ST} = 85°$, $\overset{\frown}{SQ} = 95°$, and $\overset{\frown}{TR} = 175°$, find $\angle P$.



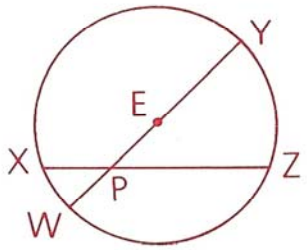
13 Given: $\overset{\frown}{AB} = 85°$, $\overset{\frown}{CD} = 25°$

Find: $\angle AED$



14 Given: $\overline{WY}$ is a diameter of $\odot E$. $\overset{\frown}{WX} = 50°$, $\angle XPY = 120°$

Find: $\overset{\frown}{WZ}$



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 $\overset{\frown}{IAN}$ **b** $\overset{\frown}{AN}$ **c** $\overset{\frown}{ID}$ **d** $\overset{\frown}{IE}$