

Name:

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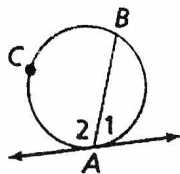
Period: 2

Angle Relationships in Circles

Learning Objective INBAT find $\angle$ and arc measures that are formed by chords, secants, and/or tangents.

Tangent and Intersected Chord Theorem

If a tangent and a chord intersect at a point on a circle, then the measure of each angle formed is half the measure of its intercepted arc.



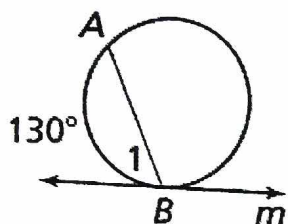
$$m\angle 1 = \frac{1}{2} m\widehat{AB}$$

$$m\angle 2 = \frac{1}{2} m\widehat{ACB}$$

Example:

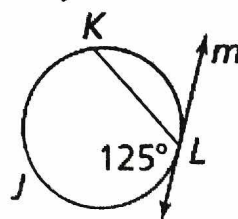
1. Line m is tangent to the circle. Find the measure of each of the following...

a. $m\angle 1$



65°

b. $m\widehat{KJL}$



250°

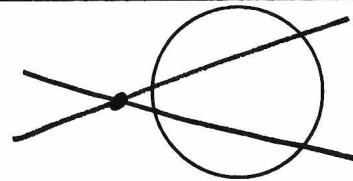
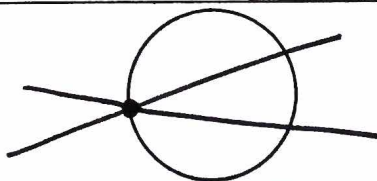
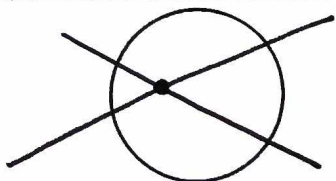
Intersecting Lines and Circles

If two nonparallel lines intersect a circle, there are three places where the lines can intersect

INSIDE the circle

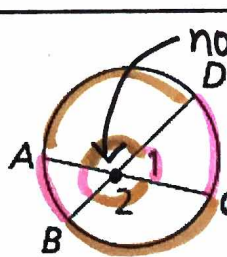
ON the circle

OUTSIDE the circle



Angles Inside the Circle Theorem

If two chords intersect inside a circle, then the measure of each angle is half the sum of the measures of the arcs intercepted by the angle and its vertical angle.



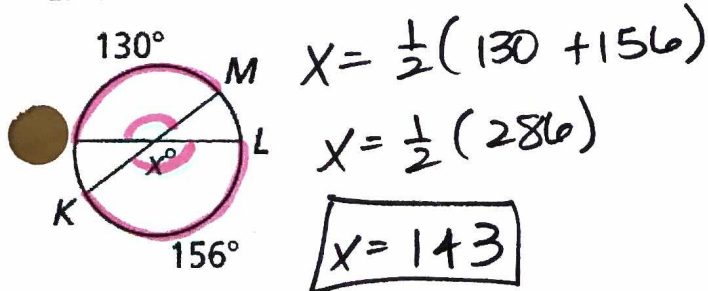
not necessarily center!

$$m\angle 1 = \frac{1}{2} (m\widehat{DC} + m\widehat{AB})$$

$$m\angle 2 = \frac{1}{2} (m\widehat{BC} + m\widehat{AD})$$

Examples:

2. Find the value of x .

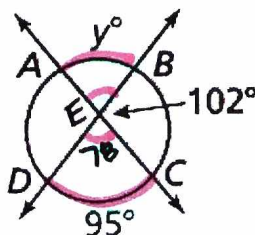


$$x = \frac{1}{2} (130 + 156)$$

$$x = \frac{1}{2} (286)$$

$$x = 143$$

3. Find the value of y .



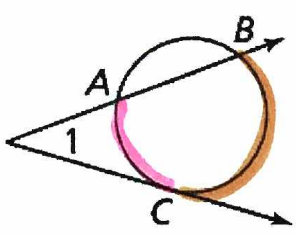
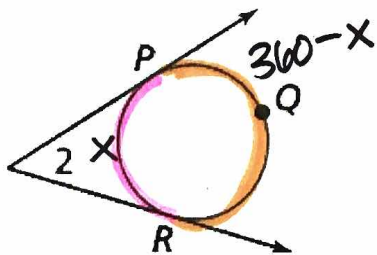
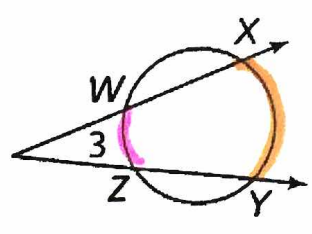
$$y = \frac{1}{2} (102 + 95)$$

$$78 = \frac{1}{2} (y + 95)$$

$$y = 61$$

Angles Outside the Circle Theorem

If a tangent and a secant, two tangents, or two secants intersect *outside* a circle, then the measure of the angle formed is half the difference of the measures of the intercepted arcs.

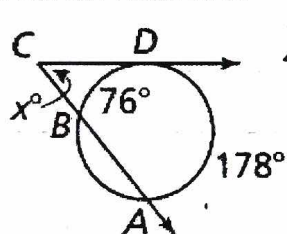
Tangent and Secant	Two Tangents	Two Secants
		
$m\angle = \frac{1}{2}(\text{big arc} - \text{small arc})$		

Circumscribed Angle: an angle whose sides are tangent to a circle

further away from vertex

Examples:

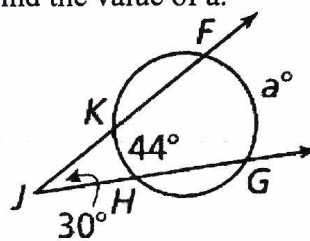
4. Find the value of x .



$$x = \frac{1}{2}(178 - 76)$$

$$\boxed{x = 51}$$

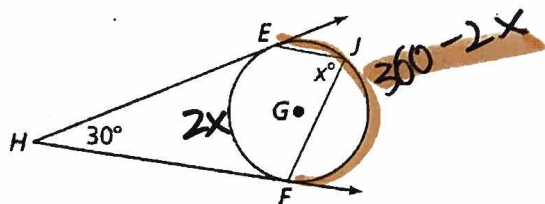
5. Find the value of a .



$$30 = \frac{1}{2}(a - 44)$$

$$\boxed{a = 104}$$

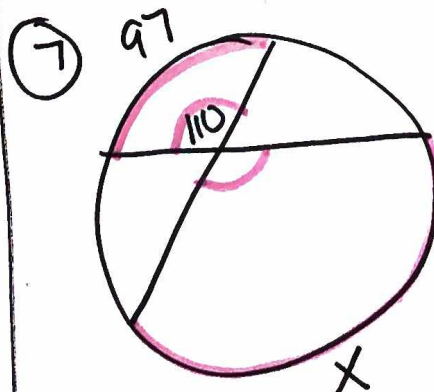
6. Find the value of x .



$$30 = \frac{1}{2}(360 - 2x - 2x)$$

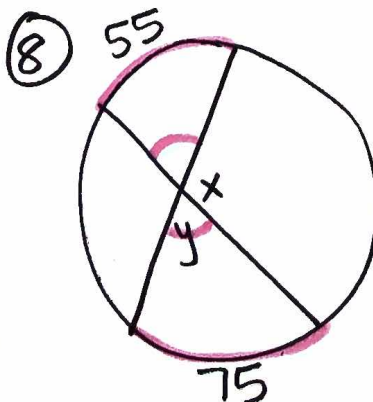
$$60 = 360 - 4x$$

$$\boxed{x = 75}$$



$$\frac{1}{2}(97 + x) = 110$$

$$\boxed{x = 123}$$



$$y = \frac{1}{2}(55 + 75)$$

$$y = 65$$

$$x + 65 = 180$$

$$\boxed{x = 115}$$