Chapter 10
Circles

10.5 Angle Relationships in Circles

Theorem

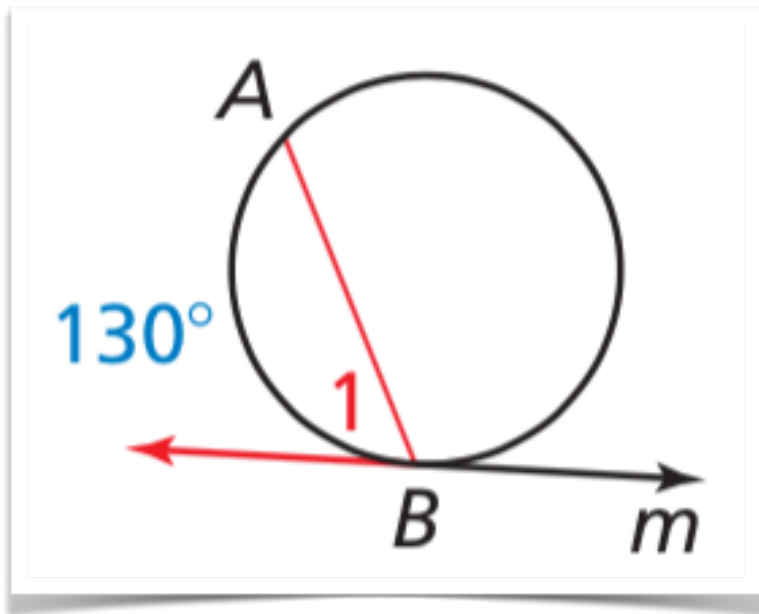|	
Tangent and Intersected Chord Theorem	If a tangent and a chord intersect at a point on a circle, then the measure of each angle formed is one-half the measure of its intercepted arc.
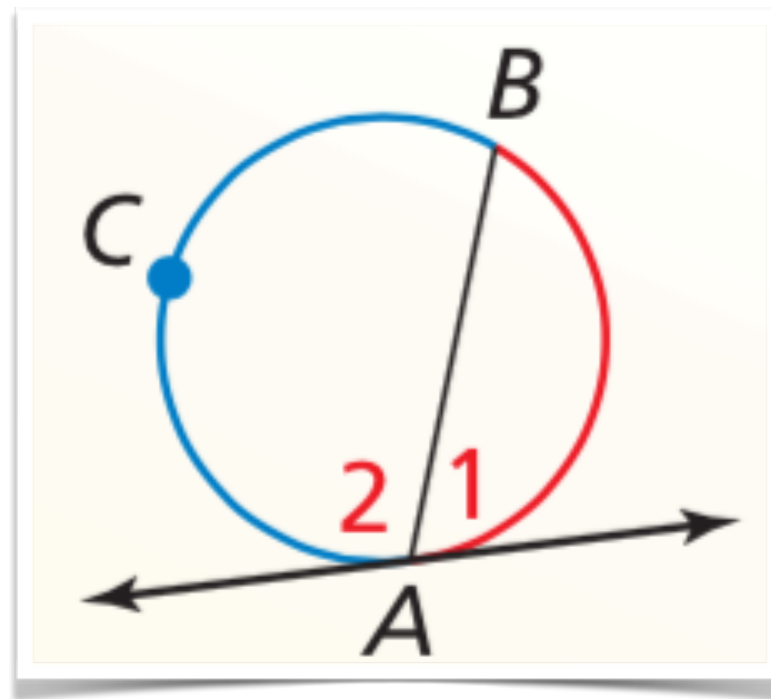
$$m\angle 1 = \tfrac{1}{2}m\widehat{AB} \qquad m\angle 2 = \tfrac{1}{2}m\widehat{BCA}$$
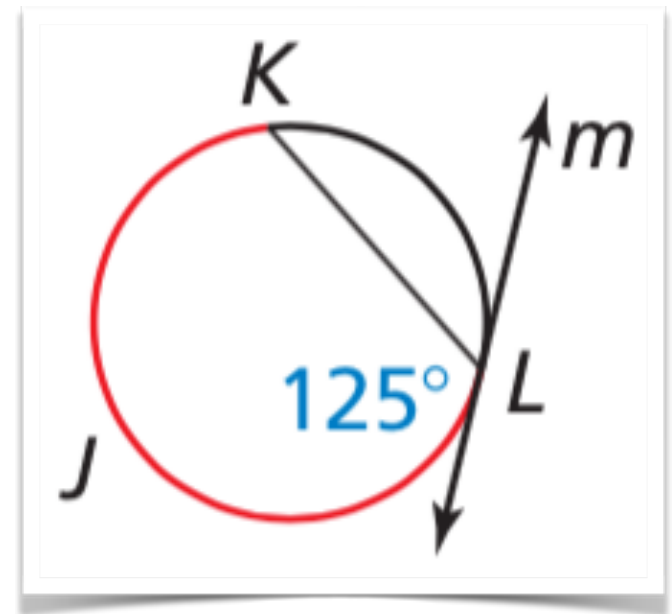
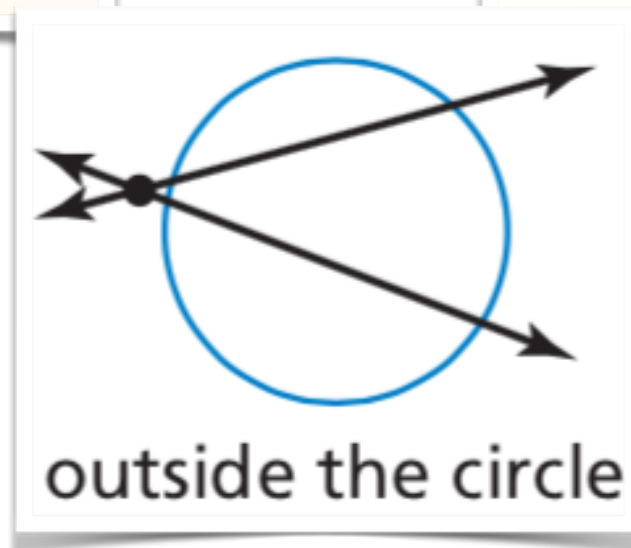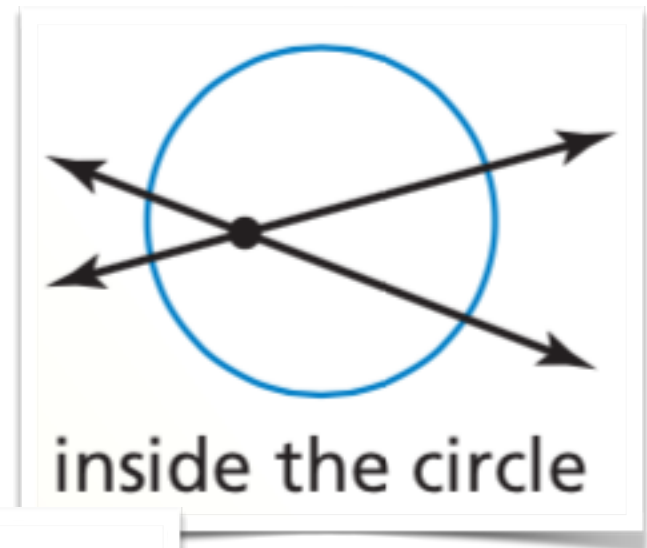# 10.5 Angle Relationships in Circles

Examples

a) Solve for $\angle 1$

b) Solve for $m\overset{\frown}{KJL}$
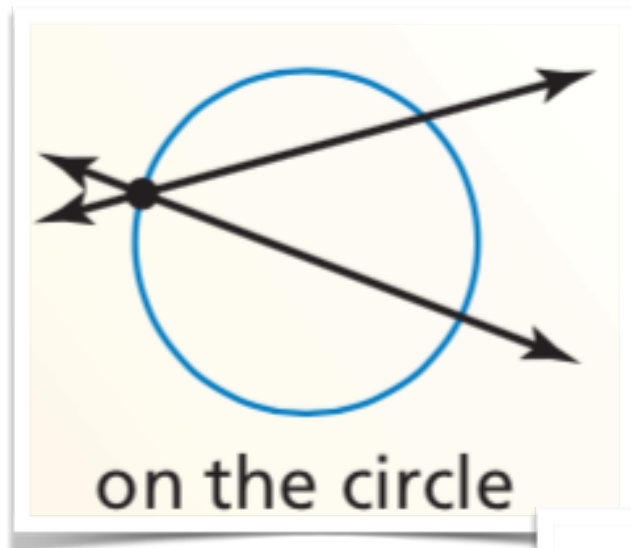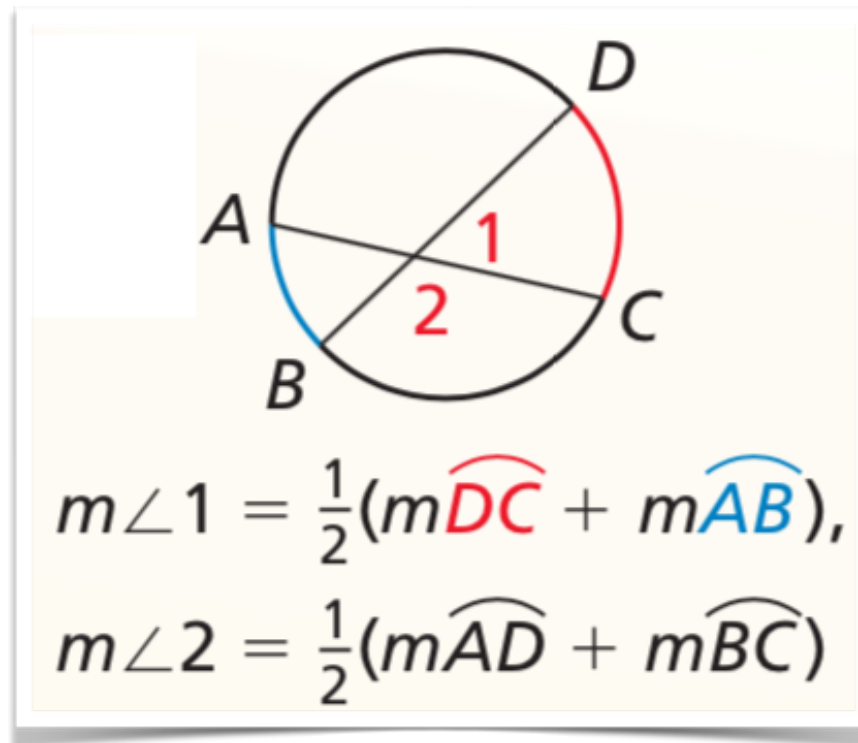
10.5 Angle Relationships in Circles

Intersecting Lines and Circles

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

on the circle

inside the circle

outside the circle

10.5 Angle Relationships in Circles

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

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

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

When is
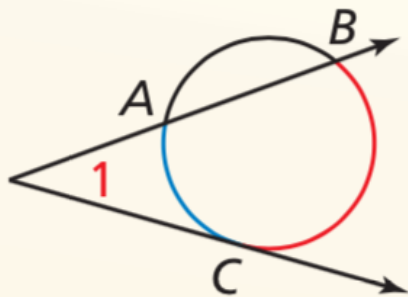
$$m\angle 1 = m\widehat{DC}$$

?

10.5 Angle Relationships in Circles

Theorem
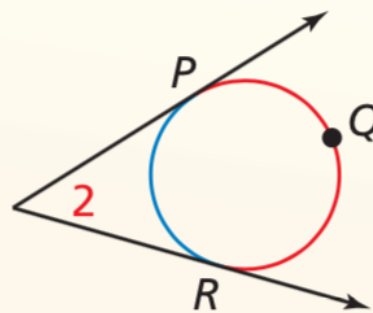
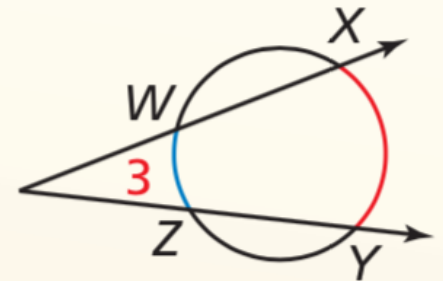| **Angles Outside the Circle Theorem**	If a tangent and a secant, two tangents, or two secants intersect outside a circle, then the measure of the angle formed is one-half the difference of the measures of the intercepted arcs.

Case 1:
Tangent-Secant

Case 2:
Tangent-Tangent

Case 3:
Secant-Secant

$m\angle 1 = \frac{1}{2}(m\widehat{BC} - m\widehat{AC})$
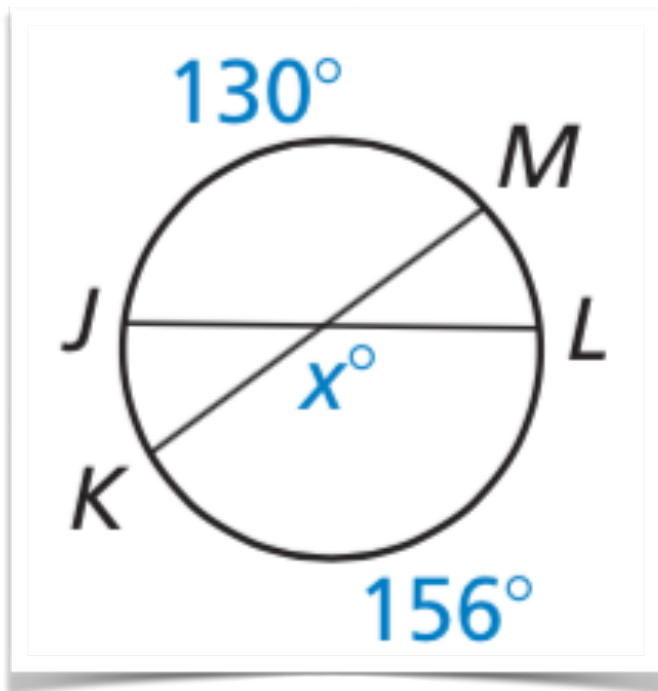
$m\angle 2 = \frac{1}{2}(m\widehat{PQR} - m\widehat{PR})$

$m\angle 3 = \frac{1}{2}(m\widehat{XY} - m\widehat{WZ})$
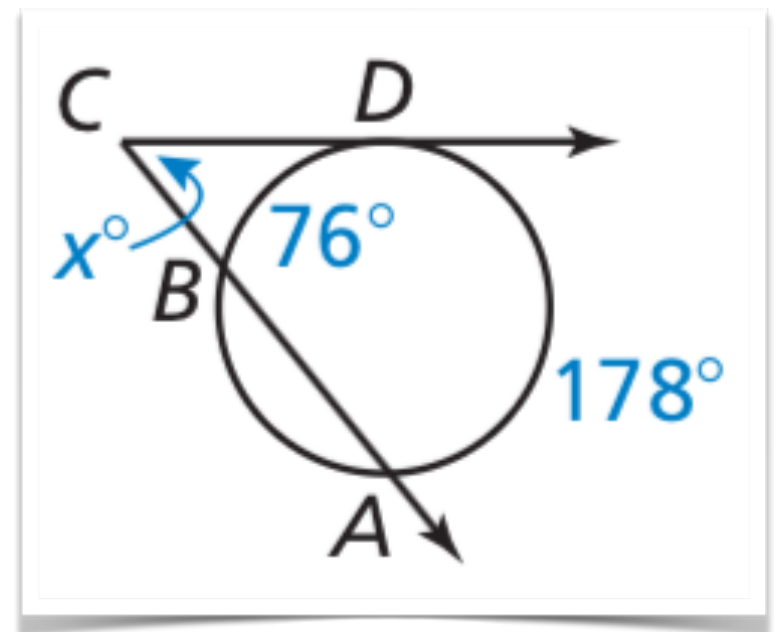
10.5 Angle Relationships in Circles

Examples

Calculate x.

a)

130°

M

J

L

x°

K

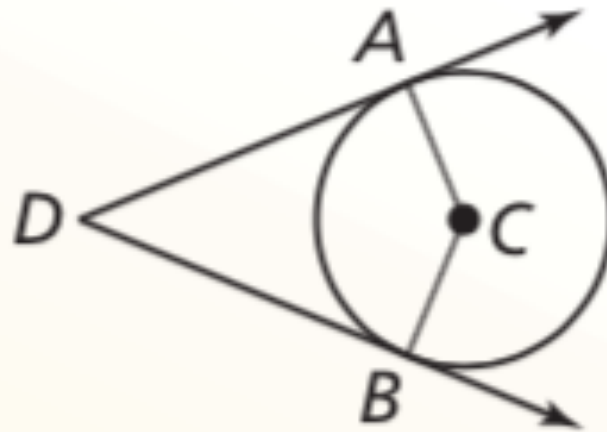156°

b)

C

D

x°

B

76°

178°

A

10.5 Angle Relationships in Circles

Theorem

Circumscribed Angle Theorem	The measure of a circumscribed angle is equal to 180° minus the measure of the central angle that intercepts the same arc.

$$m\angle ADB = 180° - m\angle ACB$$

10.5 Angle Relationships in Circles

Examples

Calculate x.

a)

135°

x°

A, C, B, D

b)

30°

x°

E, J, G, H, F