10.4 Inscribed angles and Polygons

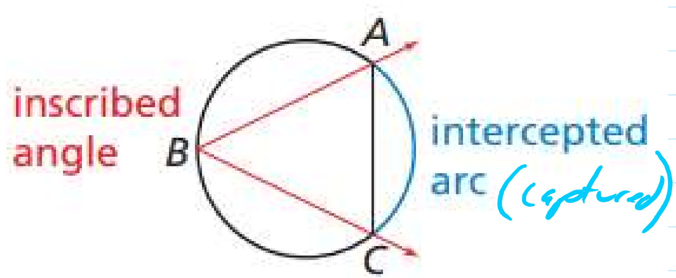
Tuesday, September 5, 2017 1:18 PM

What You Will Learn

- Use inscribed angles.
- Use inscribed polygons.

Inscribed Angle and Intercepted Arc

An **inscribed angle** is an angle whose vertex is on a circle and whose sides contain chords of the circle. An arc that lies between two lines, rays, or segments is called an **intercepted arc**. If the endpoints of a chord or arc lie on the sides of an inscribed angle, then the chord or arc is said to **subtend** the angle.



$\angle B$ intercepts $\overset{\frown}{AC}$.

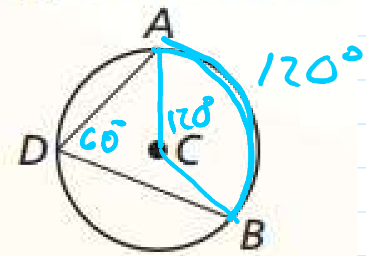
$\overset{\frown}{AC}$ subtends $\angle B$.

$\overline{AC}$ subtends $\angle B$.

Theorem 10.10 Measure of an Inscribed Angle Theorem

The measure of an inscribed angle is one-half the measure of its intercepted arc.

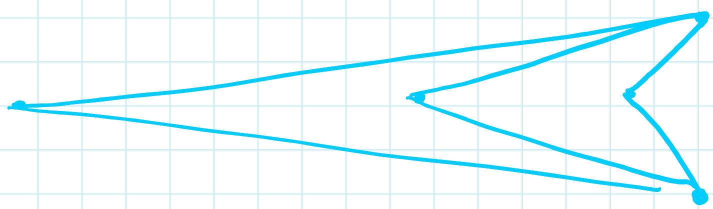
m ∠ACB



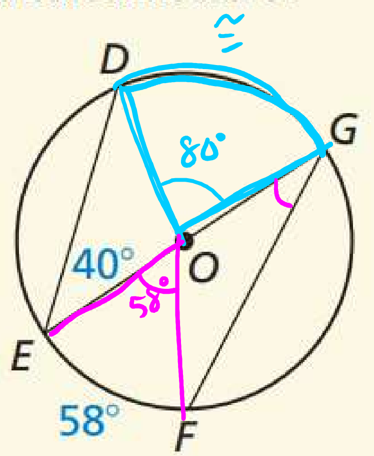
$m\angle ADB = \frac{1}{2} m\overparen{AB}$

Proof Ex. 37, p. 560

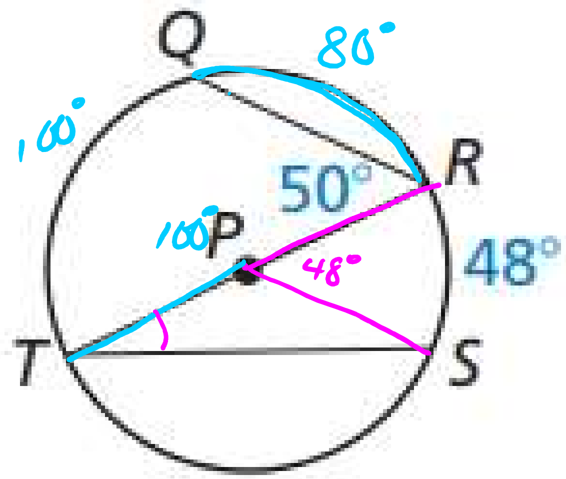
inscribed ∠ = ½ (central ∠)



Find the indicated measure.



$m\overparen{RT} = 180$



a. $m\overparen{DG}$ = 80°

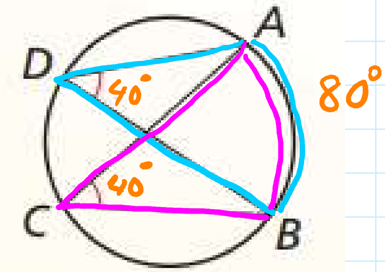
b. $m\angle G$ = 29°

a. $m\angle T$ = 24°

b. $m\overparen{QR}$ = 80°

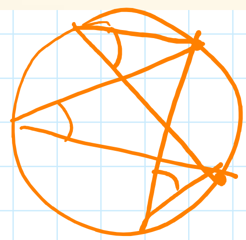
Theorem 10.11 **Inscribed Angles of a Circle Theorem**

If two inscribed angles of a circle intercept the same arc, then the angles are congruent.



Proof Ex. 38, p. 560

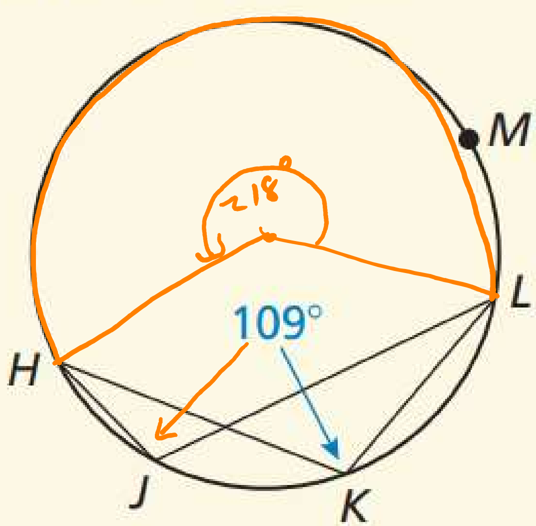
$\angle ADB \cong \angle ACB$



$\overset{\frown}{AB}$

$\overset{\frown}{AB}$

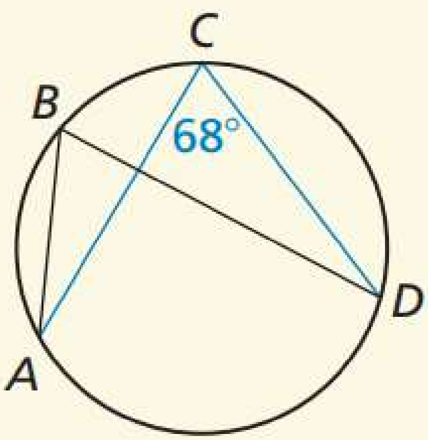
Find $m\overset{\frown}{HML}$ and $m\angle HJL$. What do you notice about $\angle HJL$ and $\angle LKH$?



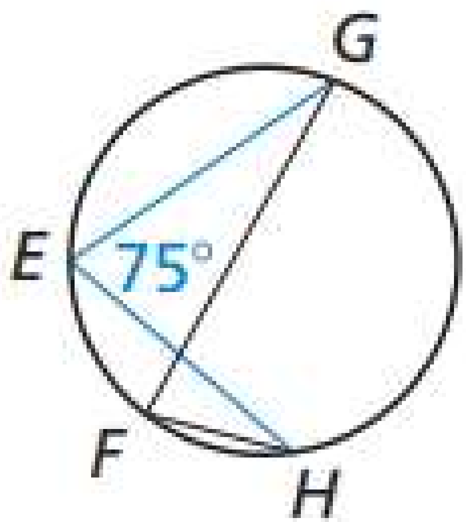
$m \angle HJL = 109°$

$m \overset{\frown}{HML} = 218°$

Given $m\angle C = 68°$, find $m\angle B$.



$m\angle B = 68°$

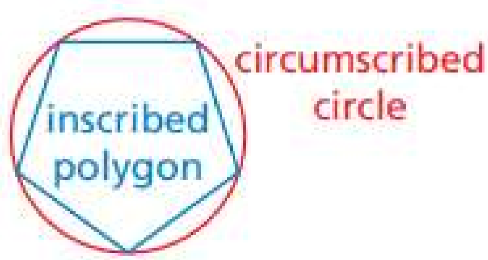


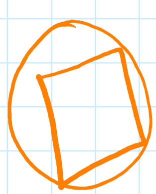
Given $m\angle E = 75°$, find $m\angle F$.

$m\angle F = 75°$

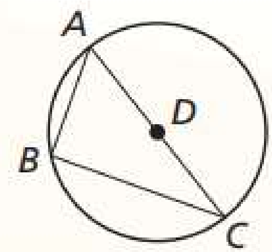
Inscribed Polygon

A polygon is an **inscribed polygon** when all its vertices lie on a circle. The circle that contains the vertices is a **circumscribed circle**.



 – Not inscribed polygon

Theorem 10.12 Inscribed Right Triangle Theorem

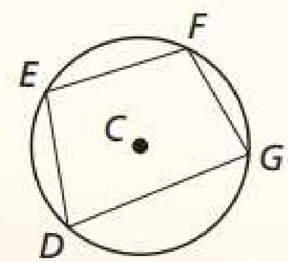


If a right triangle is inscribed in a circle, then the hypotenuse is a diameter of the circle. Conversely, if one side of an inscribed triangle is a diameter of the circle, then the triangle is a right triangle and the angle opposite the diameter is the right angle.

Proof Ex. 39, p. 560

$m\angle ABC = 90°$ if and only if $\overline{AC}$ is a diameter of the circle.

Theorem 10.13 Inscribed Quadrilateral Theorem



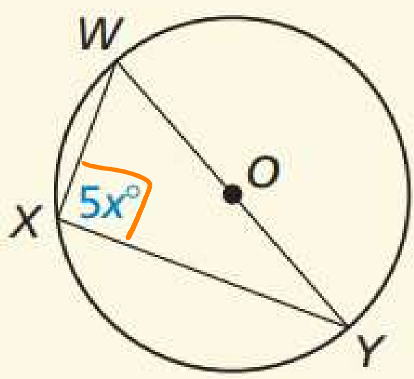
A quadrilateral can be inscribed in a circle if and only if its opposite angles are supplementary.

Proof Ex. 40, p. 560; *BigIdeasMath.com*

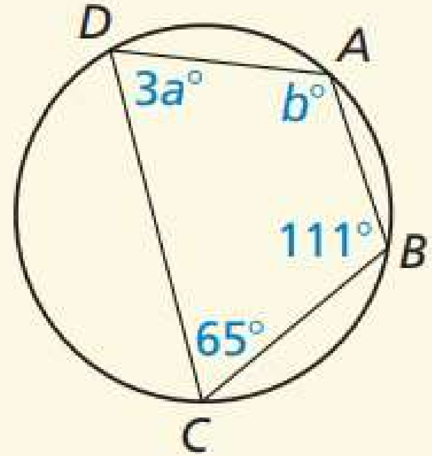
D, E, F, and G lie on $\odot C$ if and only if $m\angle D + m\angle F = m\angle E + m\angle G = 180°$.

Find the value of each variable.

a.



b.



$5x = 90$

$\frac{5x}{5} = \frac{90}{5}$

$x = 18$

$3a + 111 = 180$

$-111 \quad -111$

$3a = 69$

$\frac{3a}{3} = \frac{69}{3}$

$a = 23$

$65 + b = 180$

$-65 \quad -65$

$b = 115$

Practice *sec 10.4* **pg. 558: 1-3A, 5-17EO**