Definitions

**Inscribed Angle**
Angle whose vertex is on a circle and whose sides contain chords of the circle.

**Intercepted Arc**
The arc that lies in the interior of an inscribed angle and has endpoints on the angle.

**Inscribed Polygon**
Polygon whose vertices lie on a circle.

**Circumscribed Circle**
A circle that contains the vertices of an inscribed polygon.

**Measure of an Inscribed Angle Theorem**
The measure of an inscribed angle is one half the measure of its intercepted arc.

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

Example:
1)  
   a) Find $m\angle T$  
   b) Find $m\overset{⏜}{QT}$
2) Find $m\angle WXZ$

**Theorem**
A right triangle is inscribed in a circle IFF the hypotenuse is the diameter of the circle.

**Theorem**
A quadrilateral can be inscribed in a circle IFF its opposite angles are supplementary.

Examples/You Try...

a) Find $m\angle C$  
   b) Find $p$ and $q$  
   c) Find the measure of each angle  
   d) Find $c$ and $x$
Other Angle Relationships

- **Tangent Lines and Circles**

**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.

Examples:
a) Find $m\angle 1$

You Try...

c) Find $m\overarc{PRQ}$
d) Find $m\angle 1$
e) Find $m\overarc{XZ}$

- **Intersecting Lines and Circles**

Three places:

**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 intercepted angles.

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

a) Find the missing angles

\[
\text{Angle 1: } 115^\circ, \quad \text{Angle 2: } 97^\circ
\]

b) Find the missing arcs

\[
\text{Arc 1: } 2, \quad \text{Arc 2: } 1, \quad \text{Arc 3: } 66^\circ, \quad \text{Arc 4: } 126^\circ
\]

c) Find the missing angle

\[
\text{Angle: } 92^\circ, \quad \text{Angle: } 43^\circ
\]

d) Find \( x \)

\[
x = 45^\circ
\]

e) Find the missing angle

\[
\text{Angle: } 138^\circ, \quad \text{Angle: } 66^\circ
\]

You Try:

a) Find \( x \) and \( y \)

b) Find \( x \) for each figure

\[
\begin{align*}
\text{Diagram 1: } & \quad x = 85^\circ, \quad y = 148^\circ \\
\text{Diagram 2: } & \quad x = 115^\circ \\
\text{Diagram 3: } & \quad x = 25^\circ \\
\text{Diagram 4: } & \quad x = 35^\circ \\
\end{align*}
\]

c) Find \( m\angle 1 \)

\[
\text{Diagram: } m\angle 1 = 140^\circ, \quad m\angle 2 = 220^\circ
\]