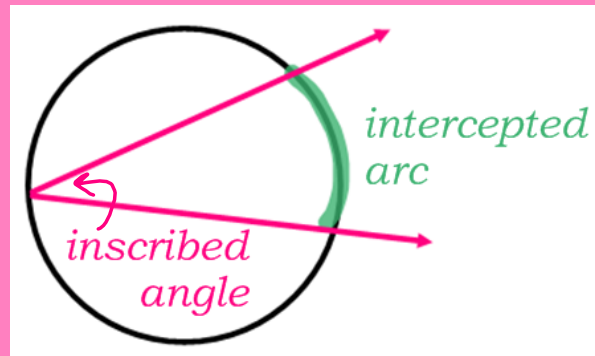


10.3 Inscribed Angles & Polygons

An **inscribed angle** is an angle whose vertex is on the circle and whose sides each contain chords of the circle.

An **intercepted arc** is the arc that lies in the interior of an inscribed angle and has endpoints on the angle.



Theorem 10.8

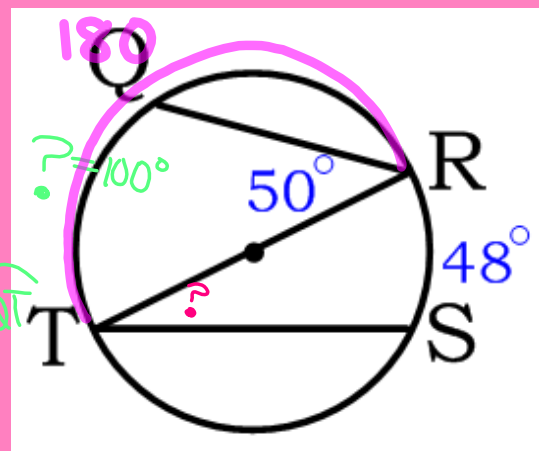
The measure of an inscribed angle is one-half the measure of its intercepted arc.

Example 1

Find each measure.

a) $m\angle T = \frac{1}{2}(48^\circ) = 24^\circ$

b) $m\widehat{QR} = 50^\circ \times 2 = 100^\circ = m\widehat{TR}$
 \downarrow
 80°

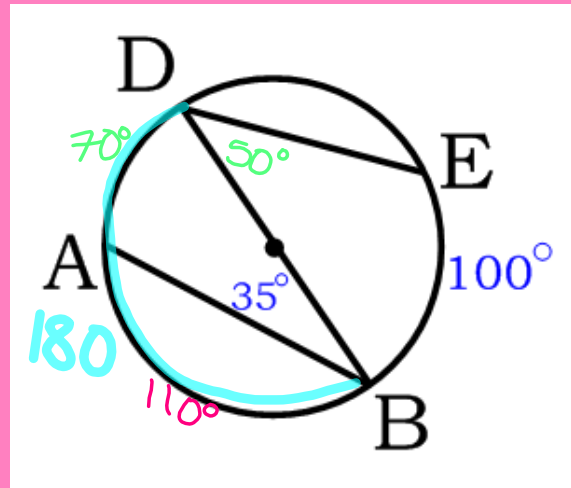


Example 2

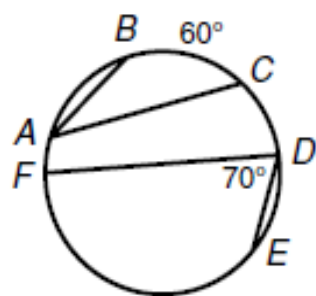
Find each measure.

a) $m\widehat{AB} = 110^\circ$

b) $m\angle D = 50^\circ$



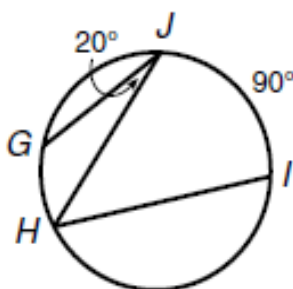
Example 3



$m\angle BAC = \frac{30}{140}$

$m\widehat{FE} = \frac{140}{}$

Example 4



$m\angle IHJ = \frac{45^\circ}{}$

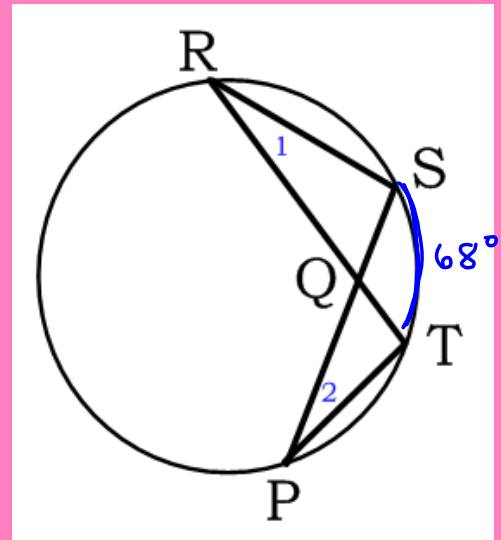
$m\widehat{GH} = \frac{40^\circ}{}$

Example 5

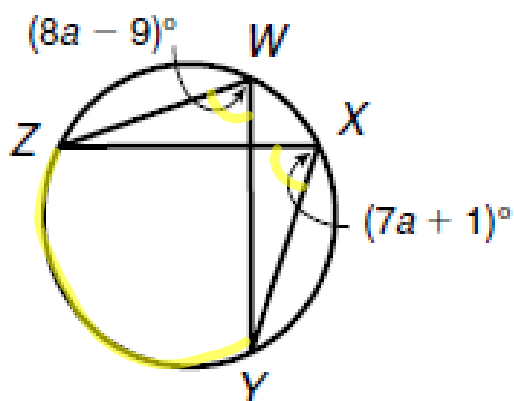
In the circle to the right,
 $m\widehat{ST} = 68$. Find $m\angle 1$
 and $m\angle 2$.

$$m\angle 1 = 34^\circ$$

$$m\angle 2 = 34^\circ$$

**Theorem 10.9**

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

Example 6

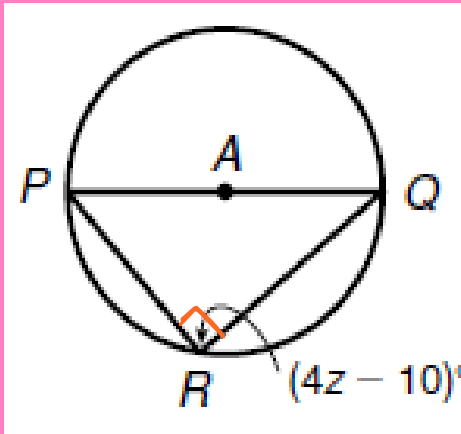
$$m\angle ZWY = \frac{71^\circ}{1}$$

$$\begin{array}{r} 8a - 9 = 7a + 1 \\ -7a \quad -7a \\ \hline a - 9 = 1 \\ +9 \quad +9 \\ \hline a = 10 \end{array}$$

$$\begin{array}{r} 8(10) - 9 \\ 80 - 9 \\ 71 \end{array}$$

Theorem 10.10

The hypotenuse of a right triangle is the diameter of a circle if and only if the triangle is inscribed in the circle.

Example 7


$$z = \frac{25}{1}$$

$$4z - 10 = 90$$

$$4z = 100$$

$$z = 25$$
Example 8

In circle X, $m\angle 4 = 7x + 3$,
 $m\angle 5 = 7x + 3$, and $m\angle 1 = 5x$.
 Find $m\angle 1$, $m\angle 2$, $m\angle 4$, & $m\angle 5$.

$$2(7x + 3) = 90$$

$$14x + 6 = 90$$

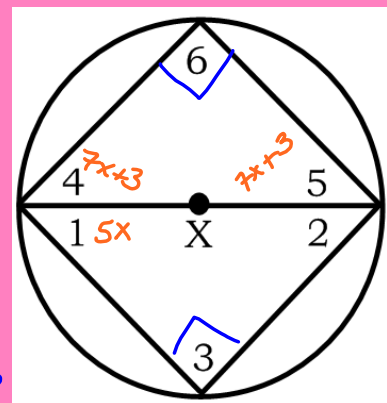
$$\begin{array}{r} 14x + 6 = 90 \\ -6 \quad -6 \\ \hline 14x = 84 \\ 14 \quad 14 \\ \hline x = 6 \end{array}$$

$$m\angle 1 = 5(6) = 30^\circ$$

$$m\angle 2 = 60^\circ$$

$$m\angle 4 = 7(6) + 3 = 45^\circ$$

$$m\angle 5 = 45^\circ$$



Theorem 10.11

If a quadrilateral is inscribed in a circle, then its opposite angles are supplementary.

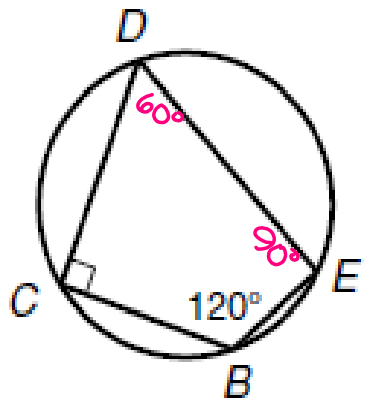
Example 9


Diagram showing a circle with an inscribed quadrilateral $CDEB$. The angles are labeled as follows:

- $m\angle C = 90^\circ$ (indicated by a right angle symbol)
- $m\angle B = 120^\circ$
- $m\angle D = 60^\circ$
- $m\angle E = 90^\circ$

Corresponding angle measures are listed to the right:

$$m\angle B = \underline{120^\circ}$$

$$m\angle C = \underline{90^\circ}$$

$$m\angle D = \underline{60^\circ}$$

$$m\angle E = \underline{90^\circ}$$
Example 10

$$8m + 10m = 180$$

$$18m = 180$$

$$m = 10$$

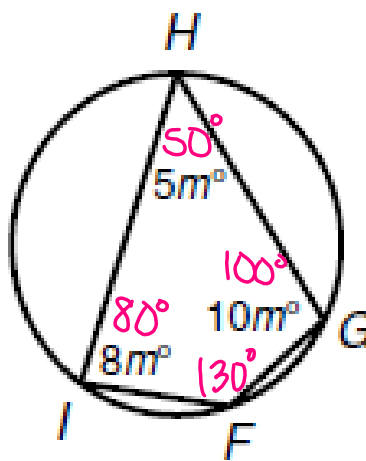


Diagram showing a circle with an inscribed quadrilateral $HIGF$. The angles are labeled as follows:

- $m\angle H = 50^\circ$ (labeled as $5m^\circ$)
- $m\angle I = 80^\circ$ (labeled as $8m^\circ$)
- $m\angle G = 100^\circ$ (labeled as $10m^\circ$)
- $m\angle F = 130^\circ$

Corresponding angle measures are listed to the right:

$$m\angle F = \underline{130^\circ}$$

$$m\angle G = \underline{100^\circ}$$

$$m\angle H = \underline{50^\circ}$$

$$m\angle I = \underline{80^\circ}$$