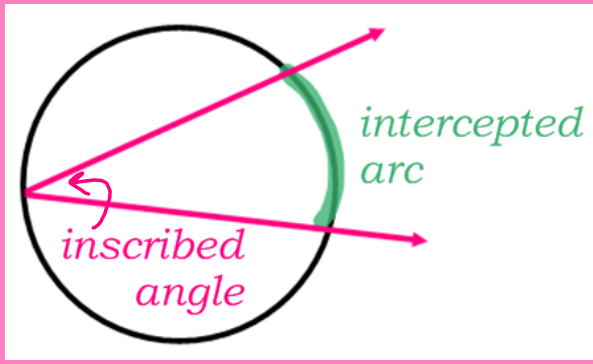
10.3 Inscribed Angles & Polygons

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

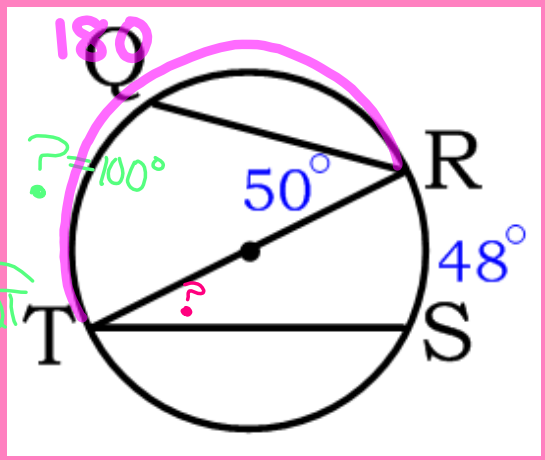
Find each measure.

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

b) $m\overset{\frown}{QR}$ $50^\circ \times 2 = 100^\circ = m\overset{\frown}{QT}$

$\downarrow$

80°

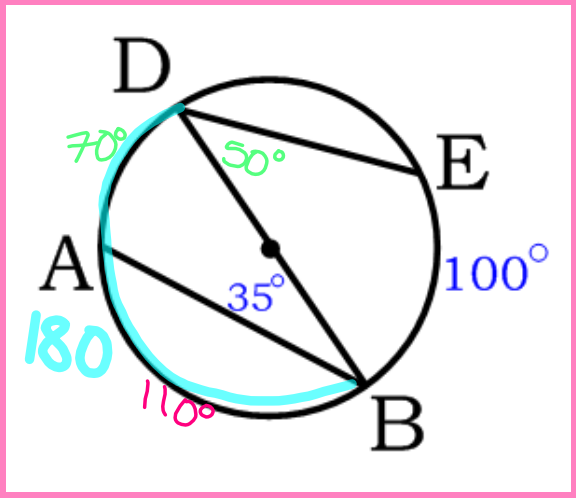


Example 2

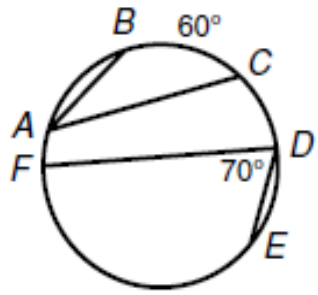
Find each measure.

a) $m\overset{\frown}{AB} = 110°$

b) $m\angle D = 50°$



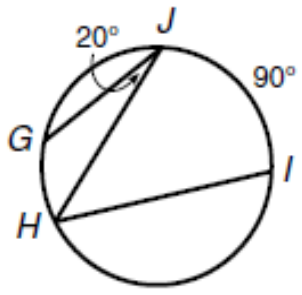
Example 3



$m\angle BAC =$ 30

$m\overset{\frown}{FE} =$ 140

Example 4



$m\angle IHJ =$ 45°

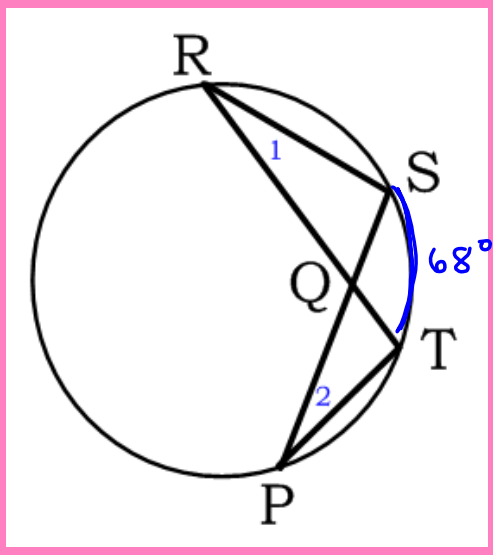
$m\overset{\frown}{GH} =$ 40°

Example 5

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

$m\angle 1 = 34°$

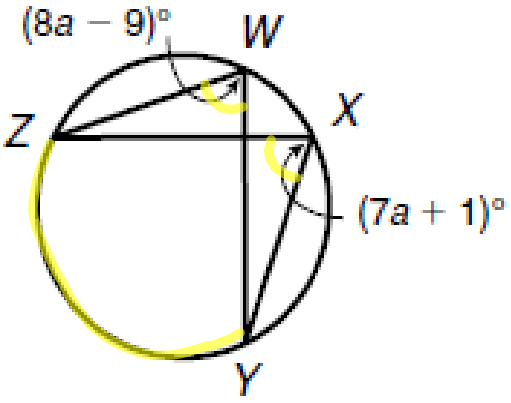
$m\angle 2 = 34°$



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



$m\angle ZWY =$ 71°

$8a - 9 = 7a + 1$

$-7a \quad -7a$

$a - 9 = 1$

$+9 \quad +9$

$a = 10$

$8(10) - 9$

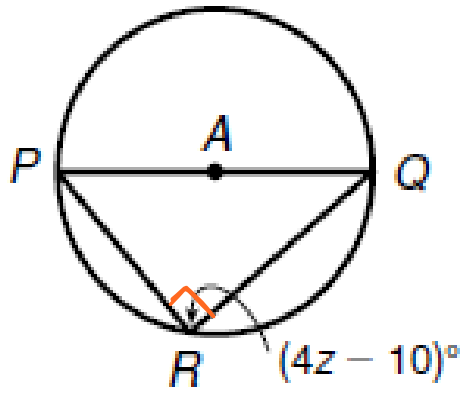
$80 - 9$

71

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



$z =$ 25

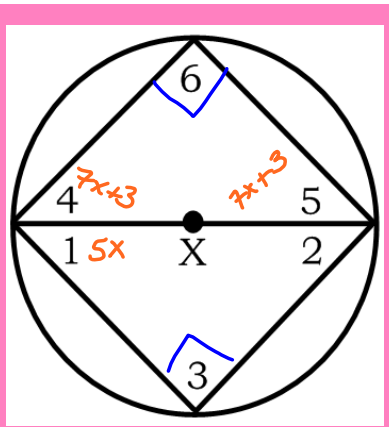
$4z - 10 = 90$

$4z = 100$

$z = 25$

Example 8

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



$2(7x+3) = 90$

$14x + 6 = 90$

$-6 \quad -6$

$\frac{14x}{14} = \frac{84}{14}$

$x = 6$

$m\angle 1 = 5(6) = 30°$

$m\angle 2 = 60°$

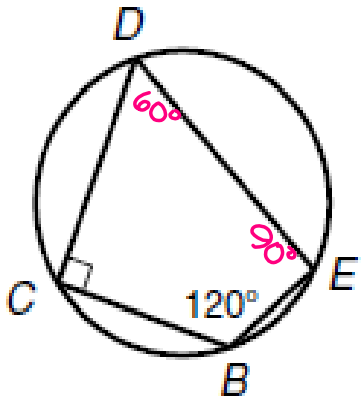
$m\angle 4 = 7(6) + 3 = 45°$

$m\angle 5 = 45°$

Theorem 10.11

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

Example 9



$m\angle B =$ 120°

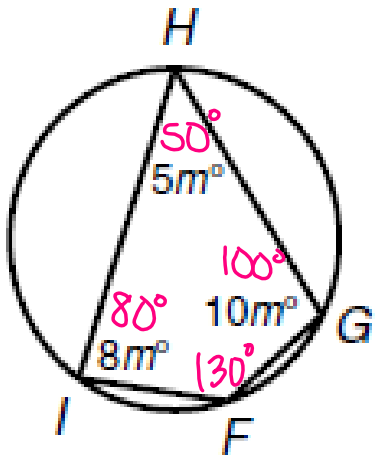
$m\angle C =$ 90°

$m\angle D =$ 60°

$m\angle E =$ 90°

Example 10

$8m+10m = 180$
$18m = 180$
$m = 10$



$m\angle F =$ 130°

$m\angle G =$ 100°

$m\angle H =$ 50°

$m\angle I =$ 80°