Name: _____

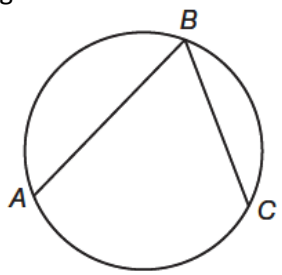
Date: _____

Period: _____

Geometry Lesson 47

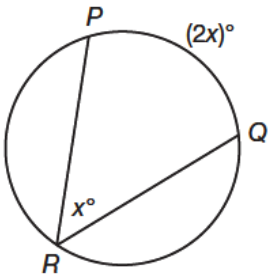
Objective: TSW understand circles and inscribed angles.

Lessons 23 and 26 introduce circles. This lesson also addresses circles and introduces inscribed angles of circles. Recall that a central angle is an angle with the center of a circle as its vertex. Another kind of angle found in circles is the inscribed angle.



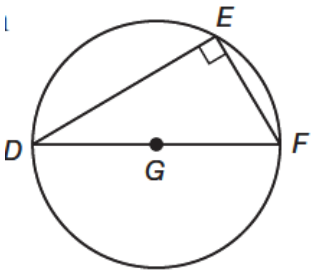
_____ Angle - An angle whose vertex is on a circle and whose sides contain chords of the circle. In the diagram, $\angle ABC$ is an inscribed angle.

_____ Arc - The arc formed by an inscribed angle. In the diagram, $\overset{\frown}{AC}$ is the intercepted arc of $\angle ABC$.



Theorem 47-1 - The measure of an inscribed angle is equal to half the measure of its intercepted arc.

Theorem 47-2 - If an inscribed angle intercepts a semicircle, then it is a right angle. $\angle DEF$ intersects the semicircle, so $m\angle DEF = 90°$.



Math Reasoning

Justify A triangle is inscribed in a circle. Use Theorem 47-1 to explain why the sum of the measures of the angles in the triangle is 180°.

Example 1 Proving and Applying Inscribed Angle Theorems

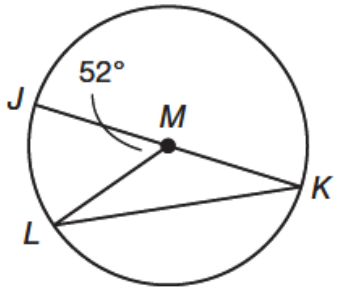
Use $\odot M$ to answer each question.

a. Name the inscribed angle.

SOLUTION

Math Language

Recall that minor arcs are labeled with 2 points, and major arcs are labeled with 3 points.

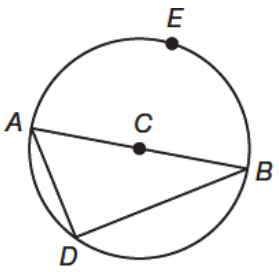


b. Name the arc intercepted by $\angle JKL$.

SOLUTION

c. If $m\angle JML = 52°$, find $m\angle JKL$.

SOLUTION



d. Prove Theorem 47-2.

Given: $\overline{AB}$ is a diameter of $\odot C$

Prove: m$\angle ADB$ = 90°

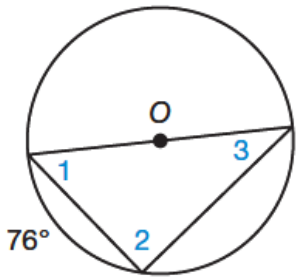
SOLUTION

Statements	Reasons
1.	
2.	
3.	
4.	

Example 2 Finding Angle Measures in Inscribed Triangles

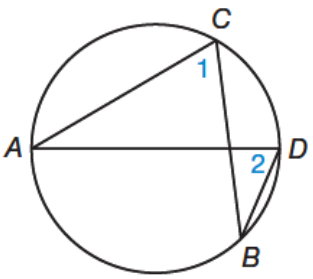
Find the measure of ∠1, ∠2, and ∠3.

SOLUTION



More than one inscribed angle can intercept the same arc. Since both of these inscribed angles measure one-half what the arc does, they have the same measure, and are congruent.

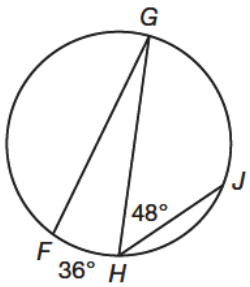
Theorem 47-3 - If two inscribed angles intercept the same arc, then they are congruent.



Example 3 Finding Measures of Arcs and Inscribed Angles

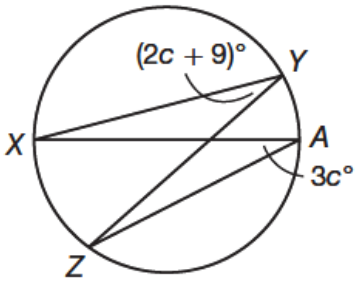
a. Find the measures of ∠*FGH* and of $\widehat{GJ}$.

SOLUTION

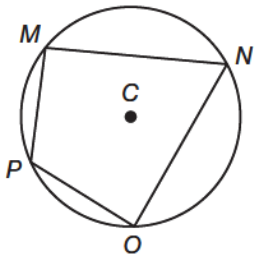


b. Find the measure of $\angle XYZ$.

SOLUTION



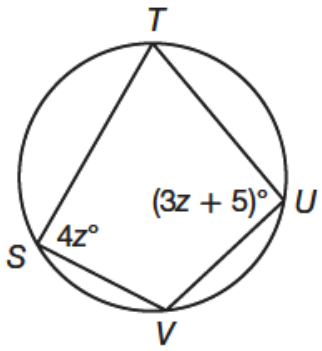
Theorem 47-4 - If a quadrilateral is inscribed in a circle, then it has supplementary opposite angles.



Example 4 Finding Angle Measures in Inscribed Quadrilaterals

Find the measure of $\angle U$.

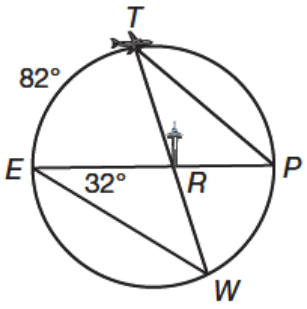
SOLUTION



Example 5 Application: Air Traffic Control

A circular radar screen in an air traffic control tower shows aircraft flight paths. The control tower is labeled *R*. One aircraft must fly from point *T* to the control tower, and then to its destination at point *P*. Find m$\angle TRP$.

SOLUTION



Math Reasoning

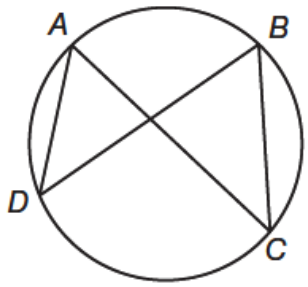
Formulate Write and solve an equation to find the sum of the measures of arcs $\overset{\frown}{EW} + \overset{\frown}{TP}$.

You Try!!!!!

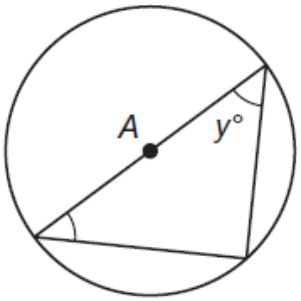
a. Prove Theorem 47-3.

Given: Inscribed angles $\angle ADB$ and $\angle ACB$

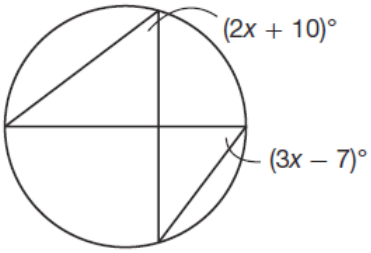
Prove: $\angle ADB \cong \angle ACB$



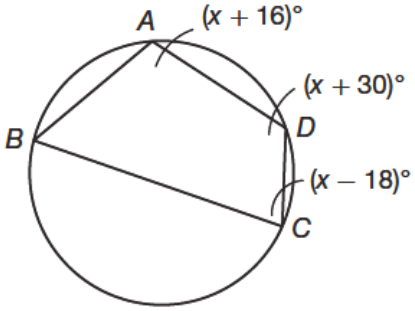
b. Find the value of *y* in the triangle inscribed in $\odot A$.



c.Find the value of *x*.



d.Find the measure of $\angle A$.



e.Air Traffic Control A radar screen in an air traffic control tower shows flight paths. The control tower is labeled *L*. Points *M*, *L*, and *P* mark the flight path of a commercial jet. Find the measure of $\angle MLP$.