Geometry H

Name: _____Key_____

10.4: Inscribed Angles and Inscribed Polygons

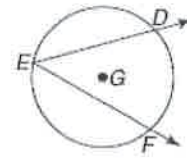Date: _____ Period:_____

LEARNING TARGETS

- I can find the measures of inscribed angles of a circle.
- I can find the angle measures of inscribed quadrilaterals.
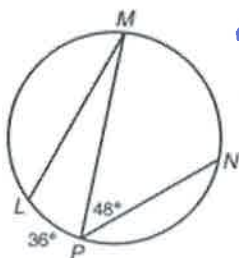
Inscribed Angles

An **inscribed angle** is an angle whose vertex is on a circle and whose sides contain chords of the circle. In $\odot G$, inscribed $\angle DEF$ intercepts $\overset{\frown}{DF}$

|		
Inscribed Angle Theorem	If an angle is inscribed in a circle, then the measure of the angle equals one-half the measure of its intercepted arc.	$\angle ABC$ is an **inscribed angle.** $\overset{\frown}{AC}$ is an **intercepted arc.** $m\angle ABC = \underline{\frac{1}{2}m\overset{\frown}{AC}}$
Theorem 10.8	If two inscribed angles of a circle intercept the same arc, then the angles are congruent.	$\angle ABC$ and $\angle ADC$ intercept $\overset{\frown}{AC}$, so $\underline{m\angle ABC = m\angle ADC}$
Theorem 10.9	An inscribed angle subtends a semicircle if an only if the angle is a right angle.	

Example 1: Using Inscribed angles to find angle and arc measures in circles.

a) Find $m\angle LMP$ and $m\overset{\frown}{MN}$

$m\overset{\frown}{MN} = 48 \cdot 2 = 96°$

$m\angle LMP = \frac{1}{2}(36) = 18°$

b) Find $m\angle GFJ$ and $m\overset{\frown}{FH}$
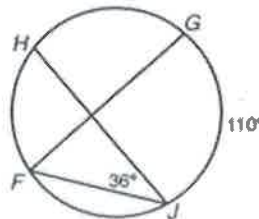
$m\angle GFJ = \frac{1}{2}(110) = 55°$

$m\overset{\frown}{FH} = 36 \cdot 2 = 72°$

Example 2: Finding measures of inscribed angles – Using Algebra

a) Find $m\angle FEG$.
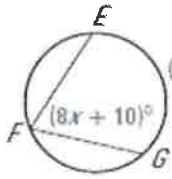
$(12x+40)°$
$(8x+10)°$

$2(8x+10) = \cancel{8} \, 12x+40$
$16x+20 = 12x+40$
$4x = 20$
$x = 5$

{OR}

$8x+10 = \frac{1}{2}(12x+40)$

$m\angle FEG = 8(5)+10$

$\boxed{= 50°}$

b. Find x.

$(5x+8)°$
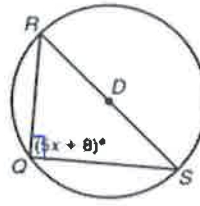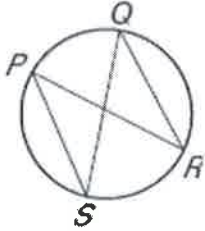
$m\angle RQS = 90°$
(intercepted arc $= 180°$)

$5x+8 = 90$
$5x = 82$

$\boxed{x = 16.4}$

Example 3: Using congruent inscribed angles
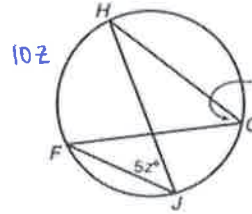
a. Name two pairs of congruent angles in the figure.

$\angle SPR \cong \angle SQR$

$\angle PSQ \cong \angle PRQ$

b. Find $m\angle FJH$.

$10z$
$(4z+9)°$
$5z°$

$m\overset{\frown}{FH} = 5z \cdot 2 = 10z$

$m\angle HGF = \frac{1}{2}(m\overset{\frown}{FH})$
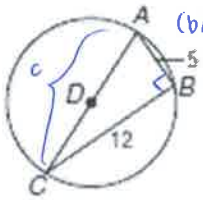
$4z+9 = \frac{1}{2}(10z)$

$4z+9 = 5z$

$\boxed{9 = z}$

$m\angle FJH = 5(9)$

$\boxed{= 45°}$

Example 4: Using Inscribed Triangles

Find AD.

12

$m\angle B = 90°$
(b/c intercepted arc $= 180°$)

$5^2+12^2 = c^2$
$169 = c^2$
$c = \sqrt{169}$
$c = 13$

$\boxed{AC = 13}$

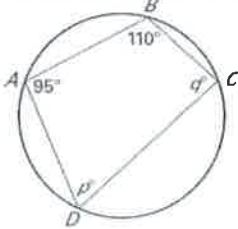$\boxed{AD = \frac{1}{2}(13) = 6.5}$

Theorem 10.10	A quadrilateral can be inscribed in a circle if and only if its opposite angles are supplementary.	ABCD is inscribed in $\odot E$.	$\angle A$ and $\angle C$ are supplementary. $\angle B$ and $\angle D$ are supplementary.

Example 5: Using Inscribed Quadrilaterals

a) Find the value of each variable.

$110°$
$95°$
$q°$
$p°$

$110 + p = 180$
$\boxed{p = 70}$

$95 + q = 180$
$\boxed{q = 85}$

b) Find the measure of each angle.

$(z+25)°$
$(z-17)°$
$(2z+2)°$
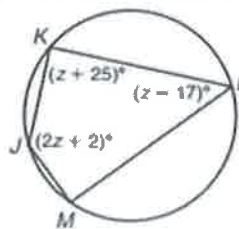
$z-17+2z+2 = 180$
$3z-15 = 180$
$3z = 195$
$\boxed{z = 65}$

$m\angle J = 132°$
$m\angle L = 48°$
$m\angle K = 90°$
$m\angle M = 90°$