

Warm Up Lesson Presentation Lesson Quiz

Holt McDougal Geometry

Warm Up

1. Identify each line or segment that intersects $\odot F$. chords: \overline{AE} , \overline{CD} secant: \overline{AE} tangent: \overline{AB}

- Find each measure.
- **2.** m∠*NMP* 110°
- **3.** m∠*NLP* 55°



Objectives

Find the measures of angles formed by lines that intersect circles.

Use angle measures to solve problems.

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5	Theorem 11-5-1						
	THEOREM	HYPOTHESIS	CONCLUSION				
	If a tangent and a secant (or chord) intersect on a circle at the point of tangency, then the measure of the angle formed is half the measure of its intercepted arc.	$ \begin{array}{c} $	m∠ABC = $\frac{1}{2}$ mÂB				

Example 1A: Using Tangent-Secant and Tangent-Chord Angles

Find each measure. $m\angle EFH \quad mGF$

$$m \angle EFH = \frac{1}{2}m\widehat{FH} = 65^{\circ}$$



m∠G =
$$\frac{1}{2}$$
m \widehat{GF}
180° – 122° = $\frac{1}{2}$ m \widehat{GF} 116° = m \widehat{GF}

Check It Out! Example 1b

Find each measure. \widehat{mSR} $m\angle SRQ = \frac{1}{2}\widehat{mSR}$ $(71^{\circ}) = \frac{1}{2}(\widehat{mSR})$ $142^{\circ} = \widehat{mSR}$



 $m\angle STU = \frac{1}{2}m\widehat{ST}$

= 83°

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Theorem 11-5-2						
THEOREM	HYPOTHESIS	CONCLUSION				
If two secants or chords intersect in the interior of a circle, then the measure of each angle formed is half the sum of the measures of its intercepted arcs.	$A \\ I \\ B \\ Chords \overline{AD} \text{ and } \overline{BC} \\ Intersect at E.$	m∠1 = $\frac{1}{2}$ (mÂB + mCD)				

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Example 2: Finding Angle Measures Inside a Circle

Find each measure. m∠*AEB*

$$m \angle AEB = \frac{1}{2} \left(\widehat{mAB} + \widehat{mCD} \right)$$
$$= \frac{1}{2} \left(139^{\circ} + 113^{\circ} \right)$$
$$= \frac{1}{2} \left(252^{\circ} \right)$$
$$= 126^{\circ}$$



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Find each angle measure.



m∠*ABD*

$$m\angle ABD = \frac{1}{2} \left(m \widehat{EC} + m \widehat{AD} \right)$$
$$m\angle ABD = \frac{1}{2} \left(37^{\circ} + 65^{\circ} \right)$$

$$m \angle ABD = \frac{1}{2} (102^{\circ}) \quad m \angle ABD = 51^{\circ}$$



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Theorem 11-5-3

If a tangent and a secant, two tangents, or two secants intersect in the exterior of a circle, then the measure of the angle formed is half the difference of the measures of its intercepted arcs.



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Find the value of x.







$$m \angle L = \frac{1}{2} \left(\widehat{mCG} - \widehat{mDF} \right)$$

$$x = \frac{1}{2} \left(\widehat{mAD} - \widehat{mBD} \right)$$

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$$x = \frac{1}{2} \left(\widehat{a3^{\circ}} - x^{\circ} \right)$$

$$x = \frac{1}{2} \left(200^{\circ} - 74^{\circ} \right)$$

$$x = 33^{\circ}$$

	_				
Ang	ile R	elatio	nships	in Ci	rcles

VERTEX OF THE ANGLE	MEASURE OF ANGLE	DIAGRAMS		
On a circle	Half the measure of its intercepted arc	$m \angle 1 = 60^{\circ}$	$m \angle 2 = 100^{\circ}$	
Inside a circle	Half the sum of the measures of its intercepted arcs	44° 1 86°	$m∠1 = \frac{1}{2}(44^{\circ} + 86^{\circ})$ = 65°	
Outside a circle	Half the difference of the measures of its intercepted arcs	$m \angle 1 = \frac{1}{2}(202^{\circ} - 78^{\circ})$ $= 62^{\circ}$	$m \angle 2 = \frac{1}{2}(125^{\circ} - 45^{\circ})$ $= 40^{\circ}$	

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Example 5: Finding Arc Measures

Find mYZ. **Step 1** Find mUY. $m \angle XVY = \frac{1}{2} \left(m \widehat{UY} + m \widehat{WZ} \right)$ $180^{\circ} - 113^{\circ} = \frac{1}{2} \left(m \widehat{UY} + 68^{\circ} \right)$ $134^\circ = m\widehat{UY} + 68^\circ$ $m\widehat{UY} = 66^{\circ}$



Step 2 Find m
$$\widehat{YZ}$$
.
 $m \angle X = \frac{1}{2} (m \widehat{YZ} - m \widehat{UY})$
 $49^{\circ} = \frac{1}{2} (m \widehat{YZ} - 66^{\circ})$
 $98^{\circ} = m \widehat{YZ} - 66^{\circ}$
 $164^{\circ} = m \widehat{YZ}$

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Check It Out! Example 5

Find mLP
Step 1 Find m
$$\widehat{PR}$$
.
 $m \angle PQR = \frac{1}{2} (m\widehat{MS} - m\widehat{PR})$
 $26^{\circ} = \frac{1}{2} (80^{\circ} - m\widehat{PR})$
 $52^{\circ} = 80^{\circ} - m\widehat{PR}$
 $28^{\circ} = m\widehat{PR}$



Step 2 Find \widehat{mLP} .

$$m\widehat{LR} = m\widehat{LP} + m\widehat{PR}$$

100° = m $\widehat{LP} + 28°$
72° = m \widehat{LP}



Lesson Quiz: Part I

Find each measure.

1. m∠*FGJ* 41.5°

2. m∠HJK 65°



Lesson Quiz: Part II

3. An observer watches people riding a Ferris wheel that has 12 equally spaced cars.

Find *x*. 30°





Lesson Quiz: Part III

4. Find m*CE*. 12°



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