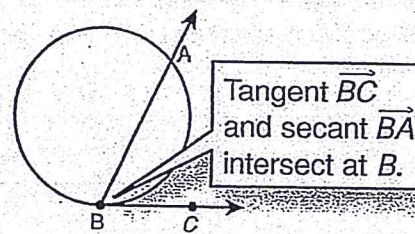


KEY TOOLKIT

**LESSON 11-5** Review for Mastery  
**Angle Relationships in Circles**

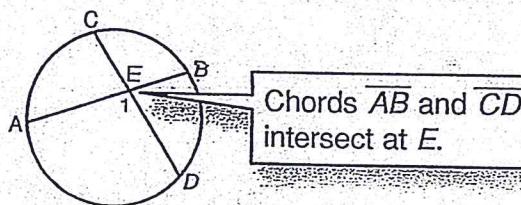
If a tangent and a secant (or chord) intersect on a circle at the point of tangency, then the measure of the angle formed is half the measure of its intercepted arc.



Tangent  $\overline{BC}$  and secant  $\overline{BA}$  intersect at B.

$$m\angle ABC = \frac{1}{2}m\widehat{AB}$$

If two secants or chords intersect in the interior of a circle, then the measure of the angle formed is half the sum of the measures of its intercepted arcs.

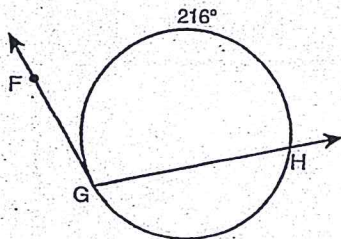


Chords  $\overline{AB}$  and  $\overline{CD}$  intersect at E.

$$m\angle 1 = \frac{1}{2}(m\widehat{AD} + m\widehat{BC})$$

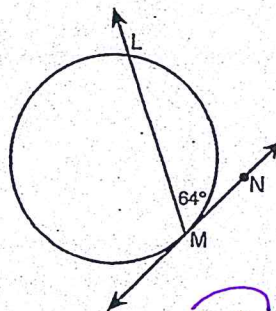
Find each measure.

1.  $m\angle FGH$



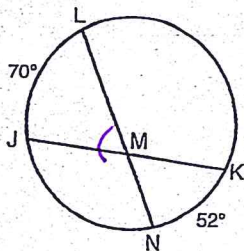
$$m\angle FGH = \frac{1}{2}(216^\circ) = \boxed{108^\circ}$$

2.  $m\widehat{LM}$



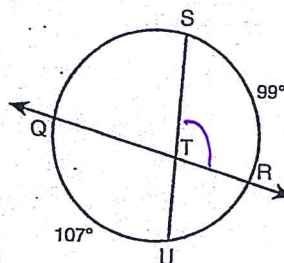
$$m\widehat{LM} = 2 \cdot 64^\circ = \boxed{128^\circ}$$

3.  $m\angle JML$



$$m\angle JML = \frac{1}{2}(70^\circ + 52^\circ) = \boxed{61^\circ}$$

4.  $m\angle STR$



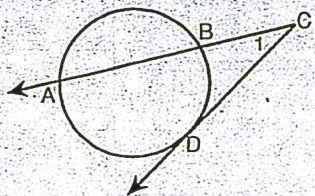
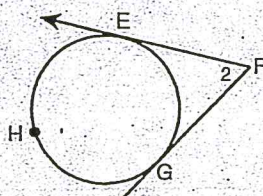
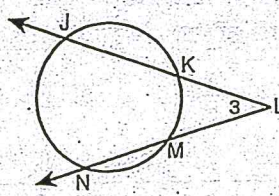
$$m\angle STR = \frac{1}{2}(107^\circ + 99^\circ) = \boxed{103^\circ}$$

LESSON  
**11-5**

**Review for Mastery**

**Angle Relationships in Circles** continued

If two segments 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.

A Tangent and a Secant	Two Tangents	Two Secants
		
$m\angle 1 = \frac{1}{2}(m\widehat{AD} - m\widehat{BD})$	$m\angle 2 = \frac{1}{2}(m\widehat{EHG} - m\widehat{EG})$	$m\angle 3 = \frac{1}{2}(m\widehat{JN} - m\widehat{KM})$

Find the value of  $x$ .

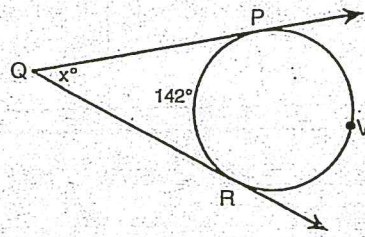
Since  $m\widehat{PVR} + m\widehat{PR} = 360^\circ$ ,  $m\widehat{PVR} + 142^\circ = 360^\circ$ ,  
and  $m\widehat{PVR} = 218^\circ$ .

$$x^\circ = \frac{1}{2}(m\widehat{PVR} - m\widehat{PR})$$

$$= \frac{1}{2}(218^\circ - 142^\circ)$$

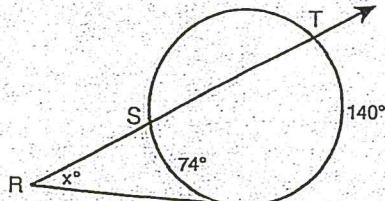
$$x^\circ = 38^\circ$$

$$x = 38$$



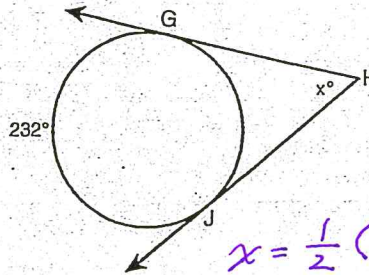
Find the value of  $x$ .

5.



$$x = \frac{1}{2}(140^\circ - 74^\circ) = \boxed{33^\circ}$$

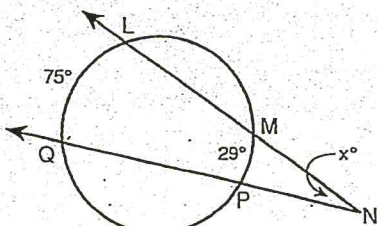
6.



$$m\widehat{GJ} = 360^\circ - 232^\circ = 128^\circ$$

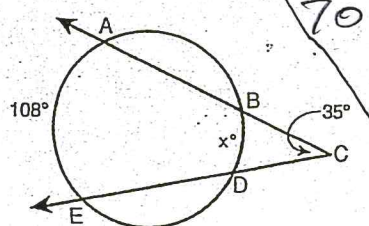
$$x = \frac{1}{2}(232^\circ - 128^\circ) = \boxed{52^\circ}$$

7.



$$x = \frac{1}{2}(75^\circ - 29^\circ) = \boxed{23^\circ}$$

8.



Easier solution

$$70^\circ = 108^\circ - x$$

$$-38 = -x$$

$$38 = x$$

$$35^\circ = \frac{1}{2}(108^\circ - x)$$

$$35^\circ = 54^\circ - \frac{x}{2}$$

$$70^\circ = 108^\circ - x$$

$$x = 108^\circ - 70^\circ = \boxed{38^\circ}$$