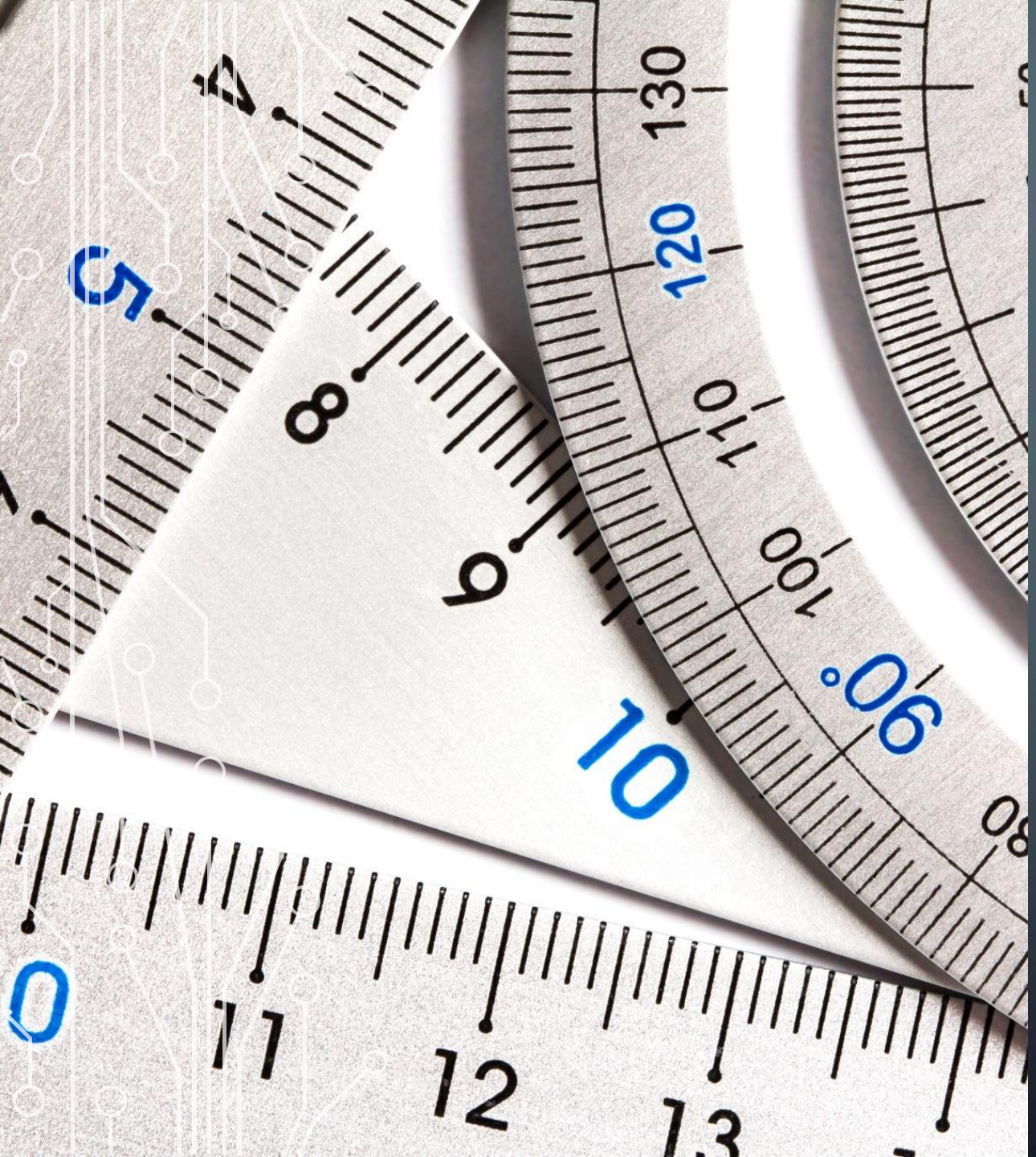
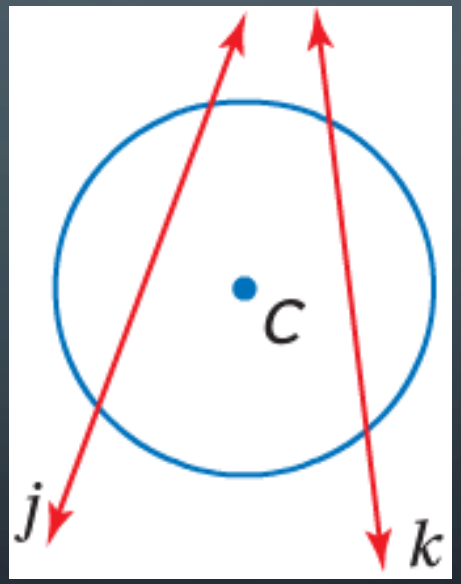


SECANTS, TANGENTS, AND ANGLE MEASURES

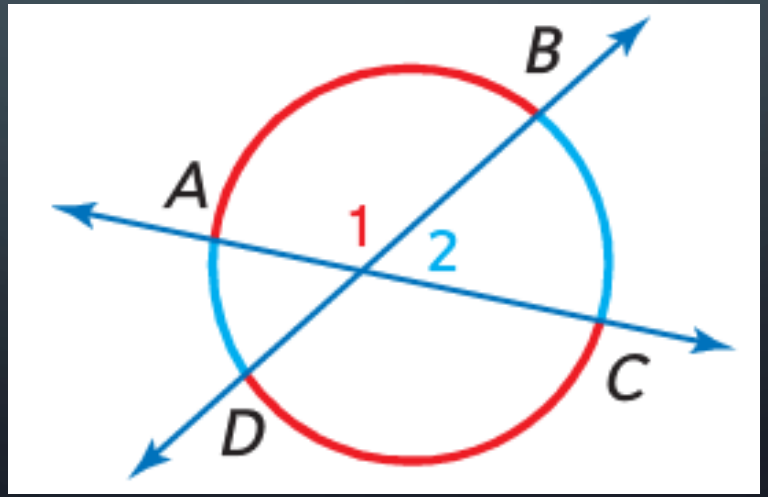
SECANT

- A secant is a line that intersects a circle in exactly two points.



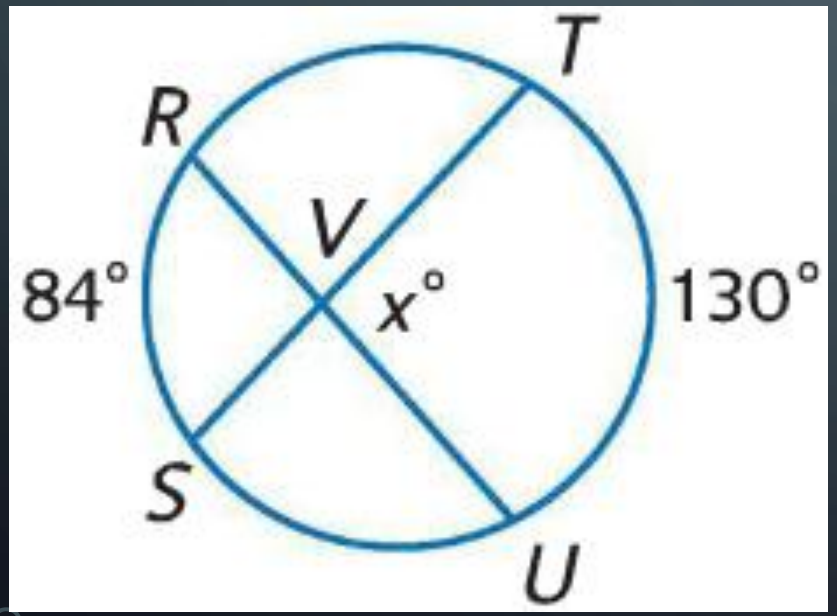
SECANT THEOREM

- If two secants or chords intersect in the interior of a circle, then the measure of an angle formed is one half the sum of the measure of the arcs intercepted by the angle and its vertical angle.



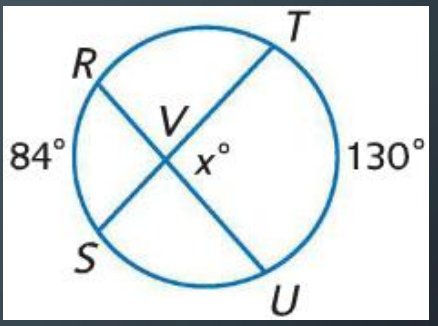
EXAMPLES

- Find x.



EXAMPLES

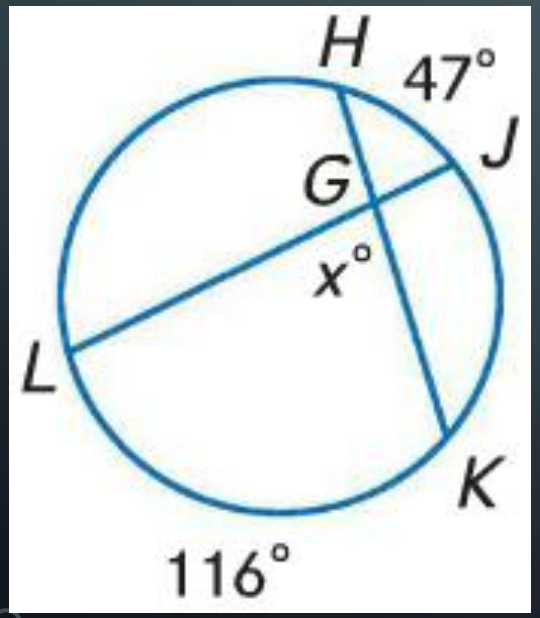
- Find x.



- $84 + 130 = 214$ Sum of the intercepting arcs
- $\frac{1}{2} * 214 = 107$ Half of the sum

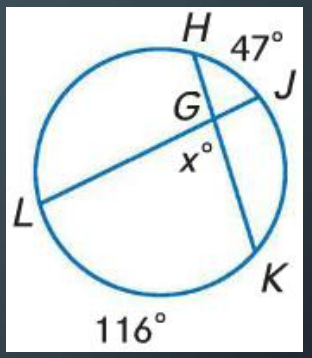
EXAMPLES

- Find x.



EXAMPLES

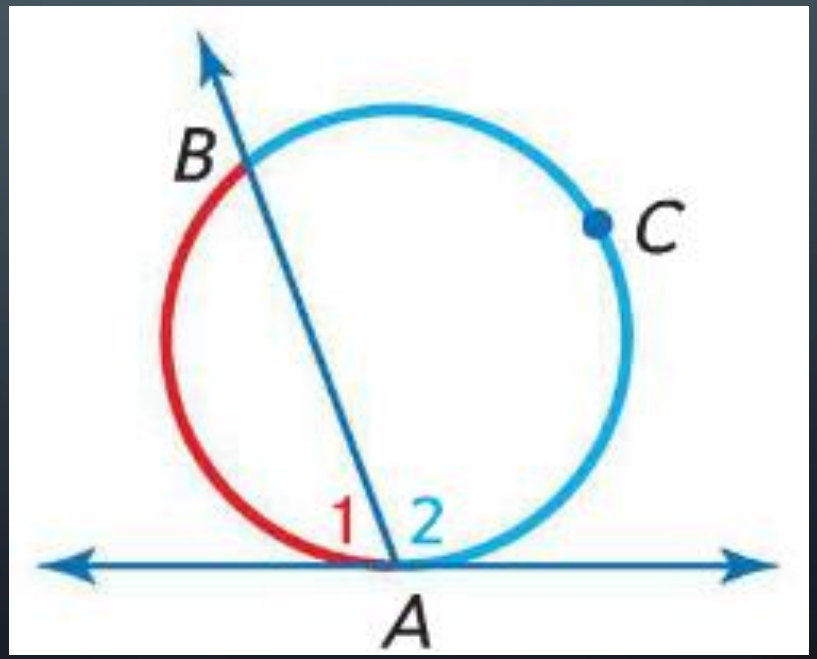
- Find x.



- $47 + 116 = 163$ Sum of the intercepting arcs
- $\frac{1}{2} * 163 = 81.5$ Half of the sum

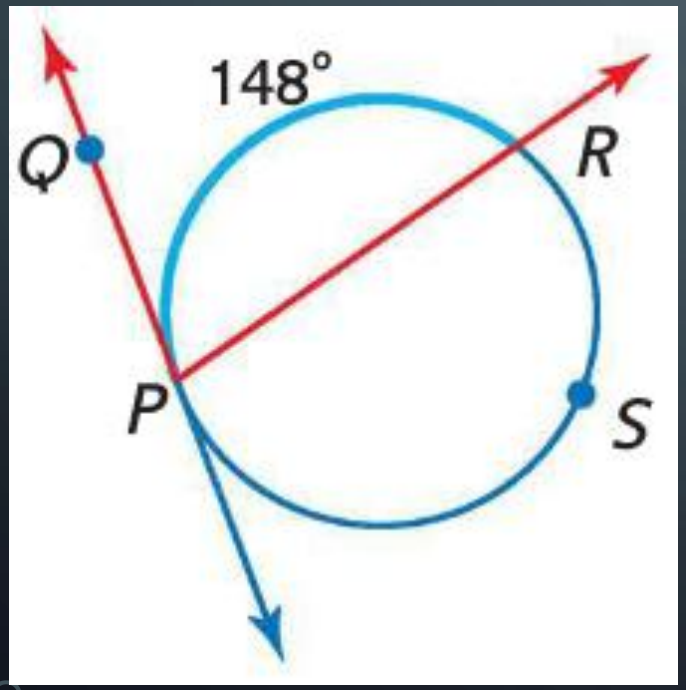
SECANT-TANGENT THEOREM

- If a secant and a tangent intersect at the point of tangency, then the measure of each angle formed is one half the measure of its intercepted arc.



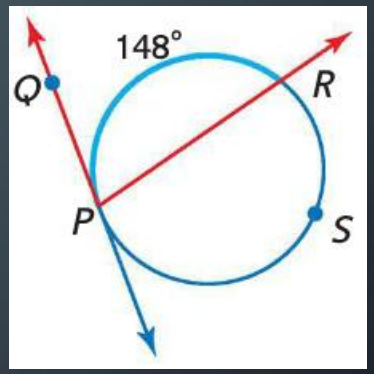
EXAMPLES

- Find each measure.



EXAMPLES

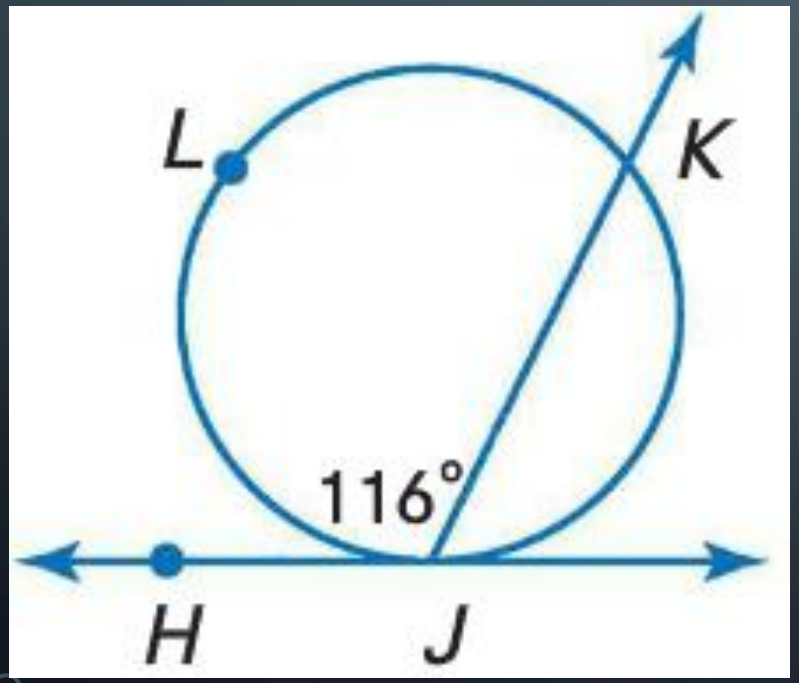
- Find each measure.



- $\frac{1}{2} * 148 = 74$ Half of the arc

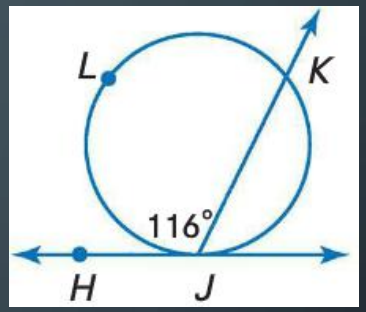
EXAMPLES

- Find m$\widehat{JLK}$.



EXAMPLES

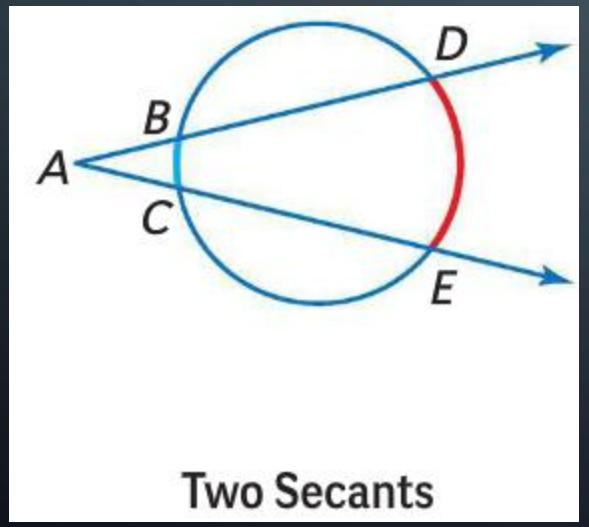
- Find m$\widehat{JLK}$.



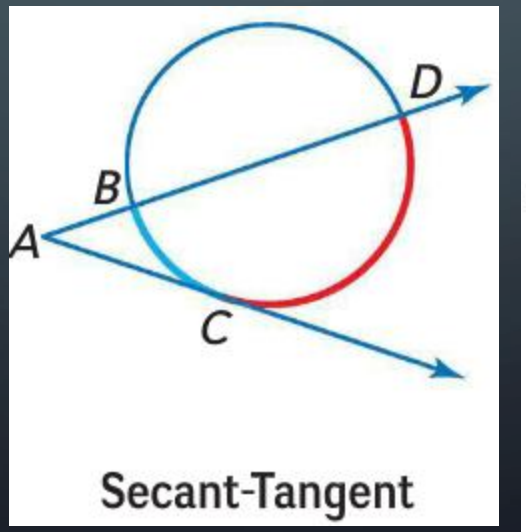
- $\frac{1}{2} * 116 = 58$ Half of the arc

THEOREM

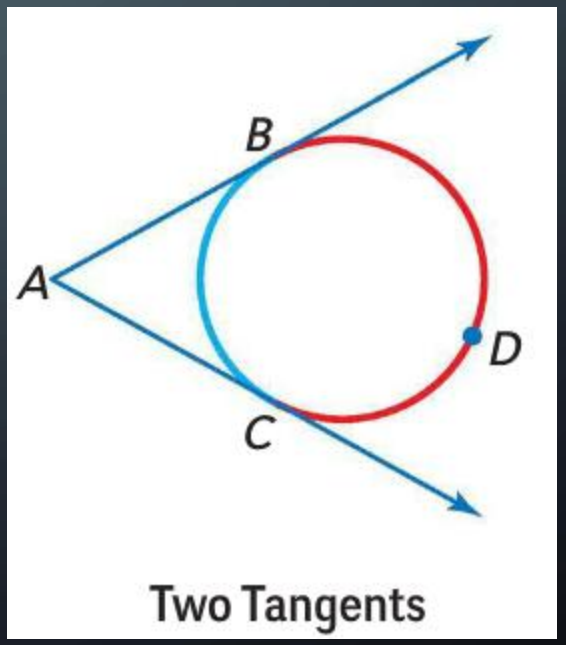
- If two secants, a secant and a tangent, or two tangents intersect outside of a circle, then the measure of the angle formed is one half of the difference of the intercepted arcs.



Two Secants



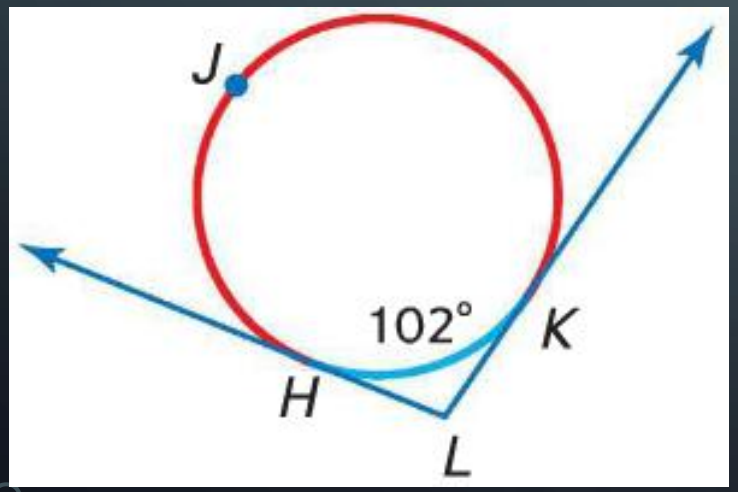
Secant-Tangent



Two Tangents

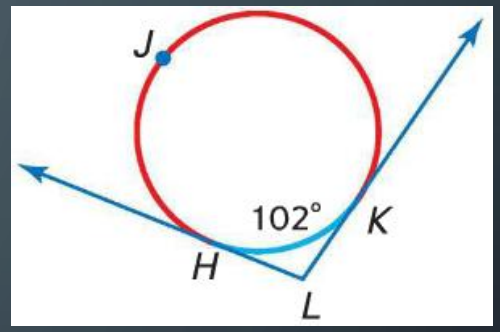
EXAMPLES

- Find m∠L.



EXAMPLES

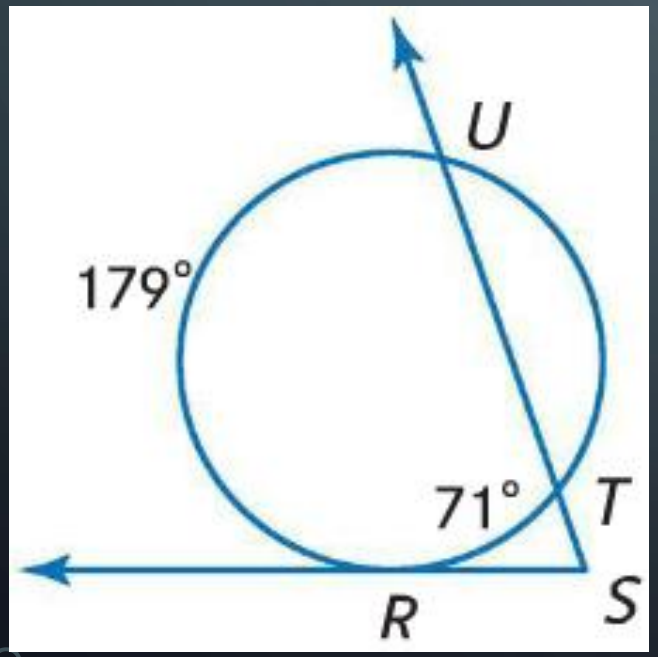
- Find m∠L.



- (360 – 102) – 102 = arcs — Difference of the intercepting arcs
- 258 – 102 = 156
- $\frac{1}{2} * 156 = 78$ — Half of the difference

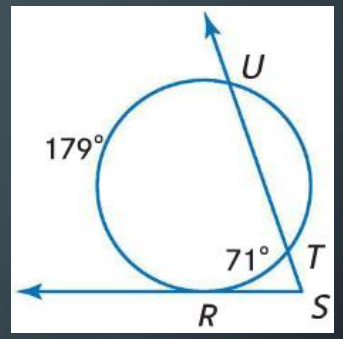
EXAMPLES

- Find m∠S.



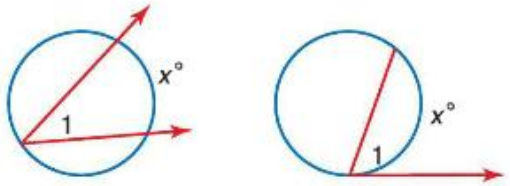
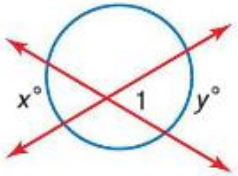
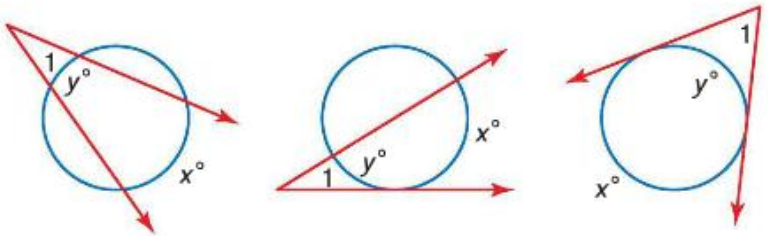
EXAMPLES

- Find m∠S.



- $179 - 71 = 108$ Difference of the intercepting arcs
- $\frac{1}{2} * 108 = 54$ Half of the difference

CIRCLE AND ANGLE RELATIONSHIPS

Vertex of Angle	Model(s)	Angle Measure
on the circle		one half the measure of the intercepted arc $m\angle 1 = \frac{1}{2}x$
inside the circle		one half the measure of the sum of the intercepted arc $m\angle 1 = \frac{1}{2}(x + y)$
outside the circle		one half the measure of the difference of the intercepted arcs $m\angle 1 = \frac{1}{2}(x - y)$