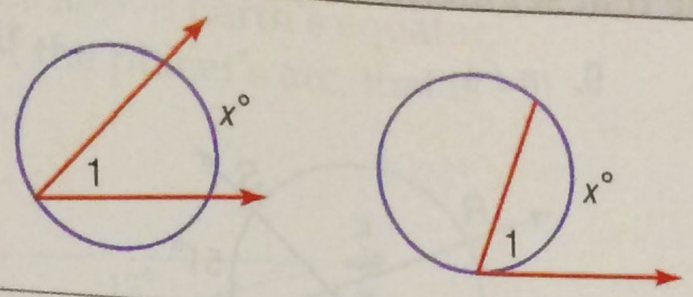
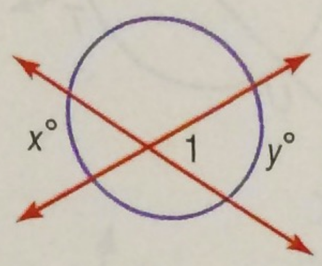
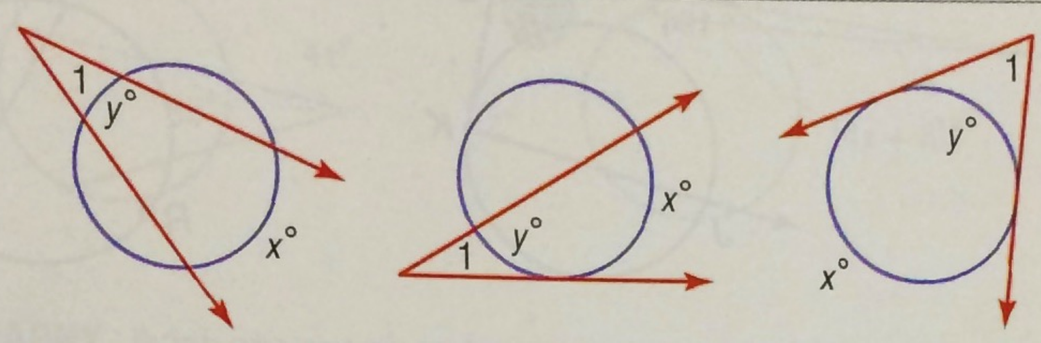
KeyConcept Circle and Angle Relationships

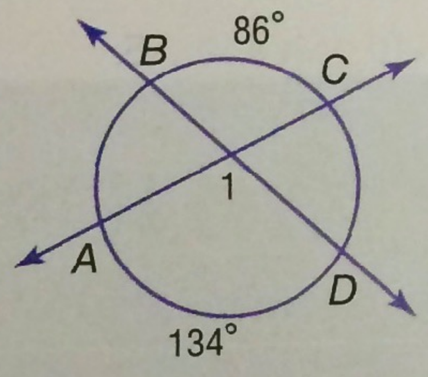
Vertex of Angle	Model(s)	Angle Measure
on the circle		one half the measure of the intercepted arc $m\angle 1 = \frac{1}{2}x$
inside the circle		one half the measure of the sum of the intercepted arc $m\angle 1 = \frac{1}{2}(x + y)$
outside the circle		one half the measure of the difference of the intercepted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

Check Your Understanding

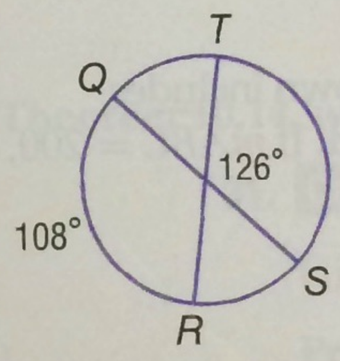
= Step-by-Step Solutions begin on page R14.

Examples 1–2 Find each measure. Assume that segments that appear to be tangent are tangent.

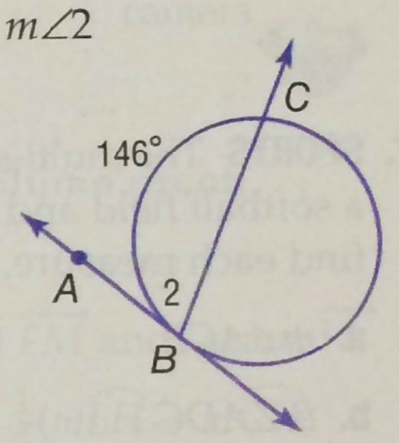
1. $m\angle 1$



2. $m\widehat{TS}$

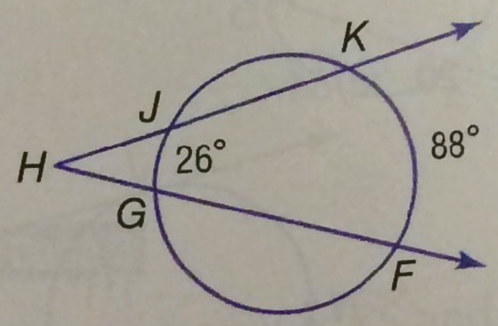


3. $m\angle 2$

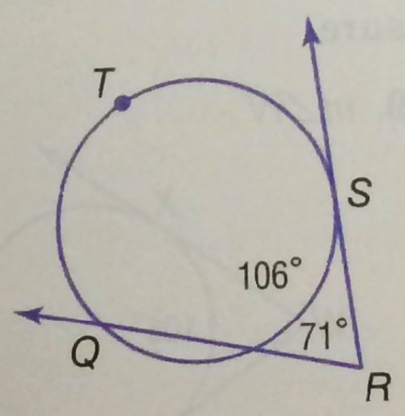


Examples 3–4

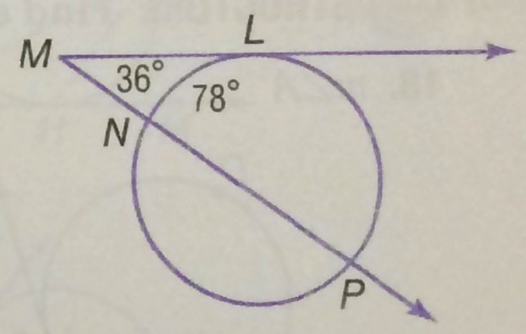
4. $m\angle H$



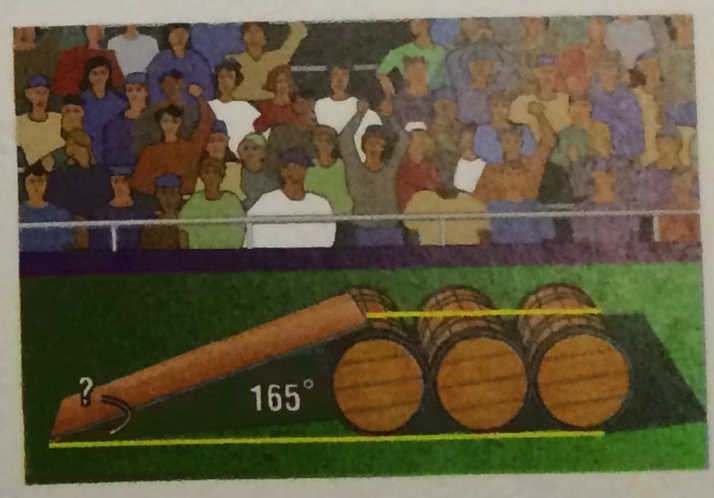
5. $m\widehat{QTS}$



6. $m\widehat{LP}$



7 **STUNTS** A ramp is attached to the first of several barrels that have been strapped together for a circus motorcycle stunt as shown. What is the measure of the angle the ramp makes with the ground?

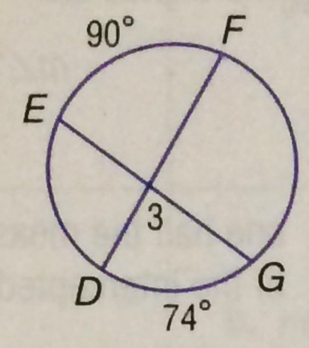


Practice and Problem Solving

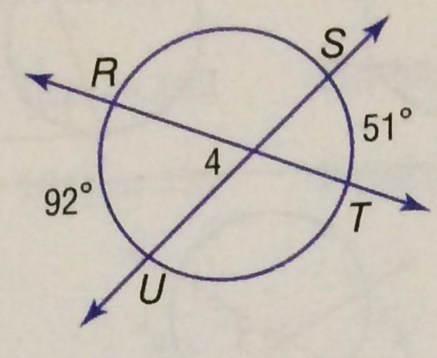
Extra Practice is on page R10.

Examples 1–2 Find each measure. Assume that segments that appear to be tangent are tangent.

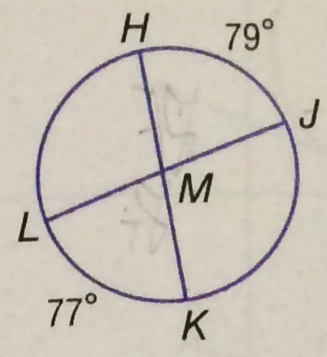
8. $m\angle 3$



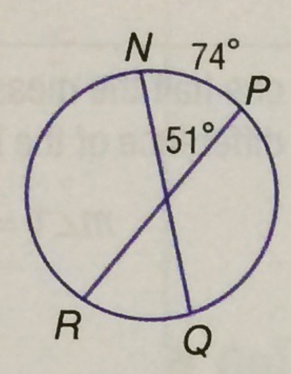
9. $m\angle 4$



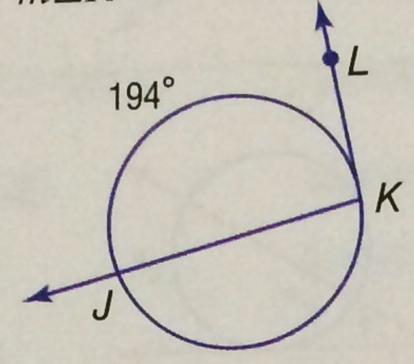
10. $m\angle JMK$



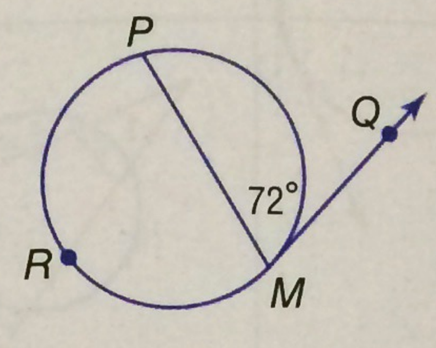
11 $m\widehat{RQ}$



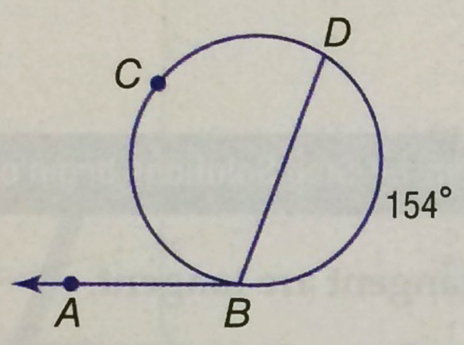
12. $m\angle K$



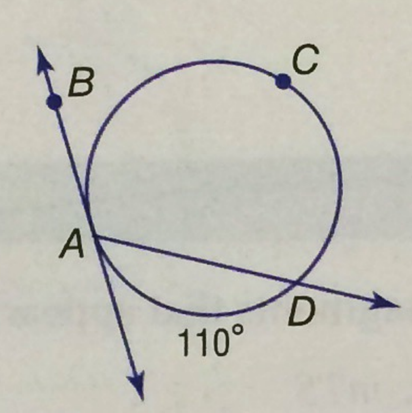
13. $m\widehat{PM}$



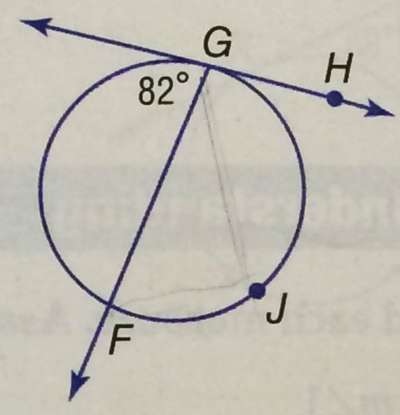
14. $m\angle ABD$



15. $m\angle DAB$



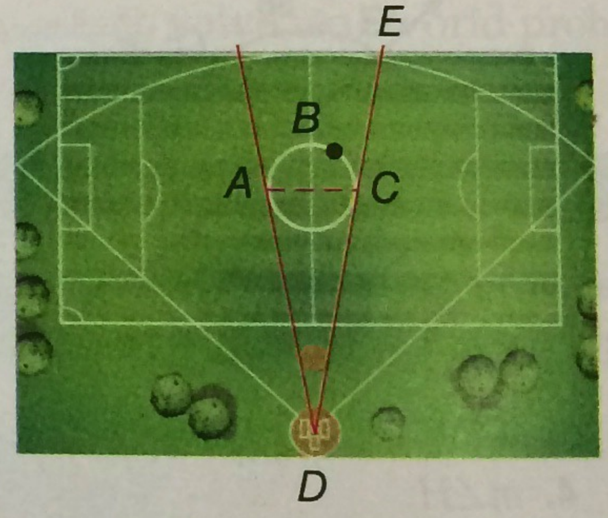
16. $m\widehat{GJF}$



17. SPORTS The multi-sport field shown includes a softball field and a soccer field. If $m\widehat{ABC} = 200$, find each measure.

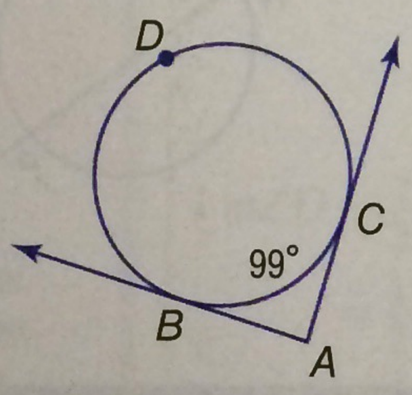
a. $m\angle ACE$

b. $m\angle ADC$

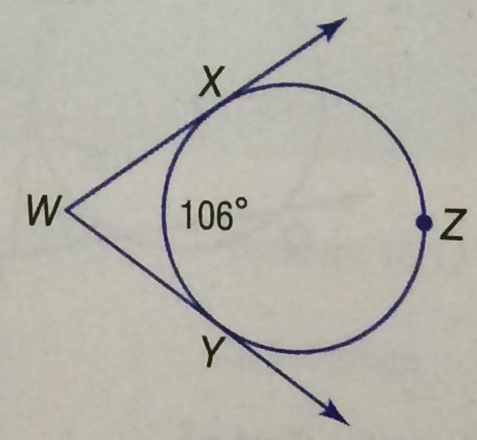


Examples 3–4 CCSS **STRUCTURE** Find each measure.

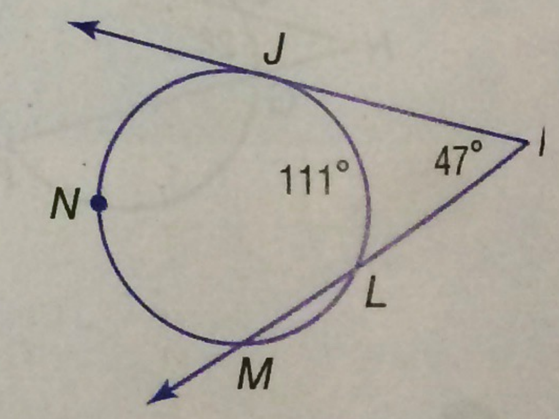
18. $m\angle A$



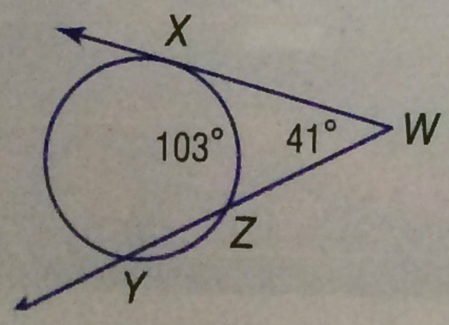
19. $m\angle W$



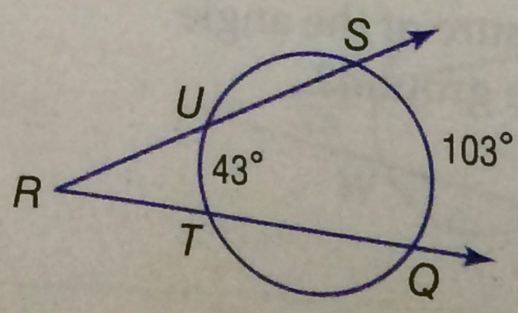
20. $m\widehat{JM}$



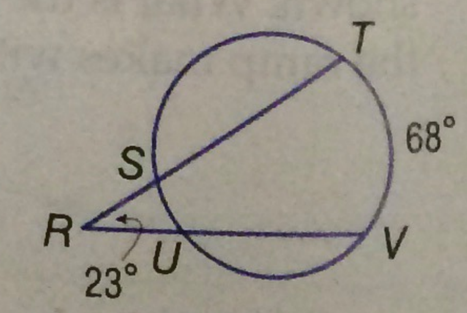
21. $m\widehat{XY}$



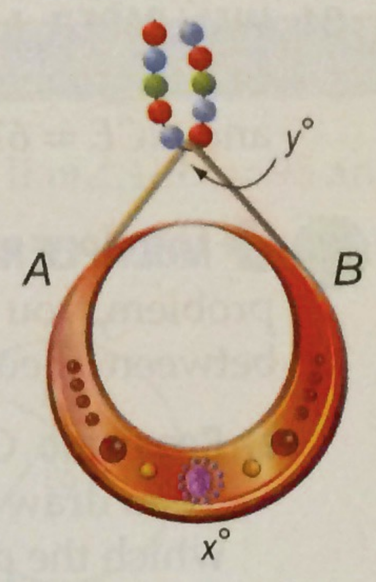
22. $m\angle R$



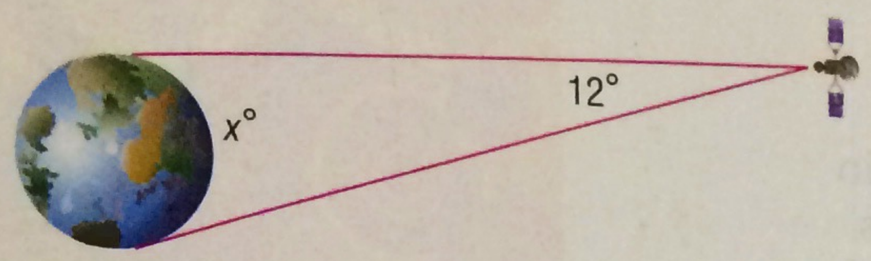
23. $m\widehat{SU}$



24. JEWELRY In the circular necklace shown, A and B are tangent points. If $x = 260$, what is y?

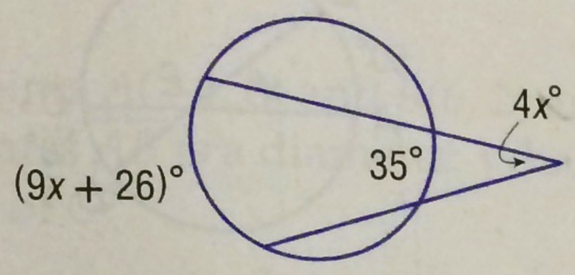


25. SPACE A satellite orbits above Earth's equator. Find x, the measure of the planet's arc, that is visible to the satellite.

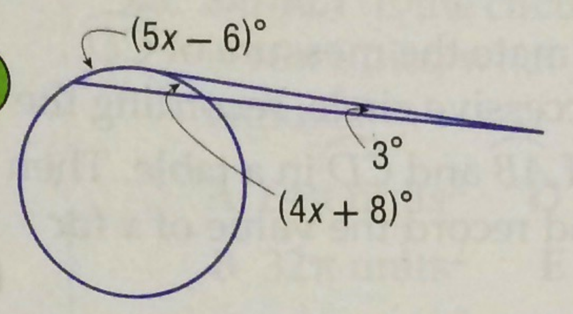


ALGEBRA **Find the value of x.**

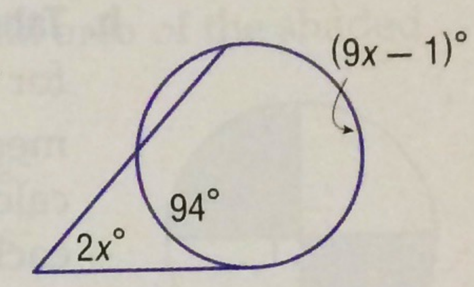
26.



27



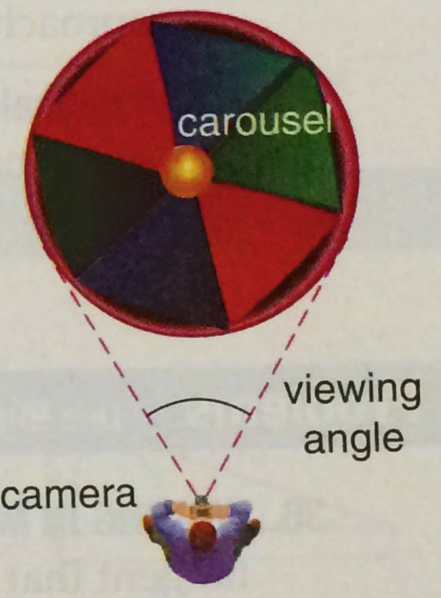
28.



29. PHOTOGRAPHY A photographer frames a carousel in his camera shot as shown so that the lines of sight form tangents to the carousel.

a. If the camera's viewing angle is 35°, what is the arc measure of the carousel that appears in the shot?

b. If you want to capture an arc measure of 150° in the photograph, what viewing angle should be used?

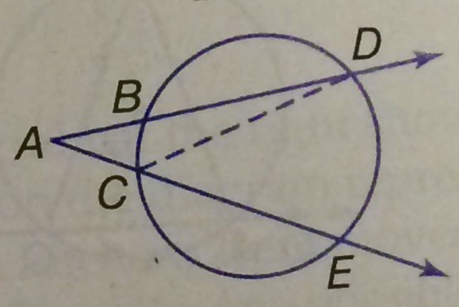


CCSS ARGUMENTS **For each case of Theorem 10.14, write a two-column proof.**

30. Case 1

Given: secants $\overrightarrow{AD}$ and $\overrightarrow{AE}$

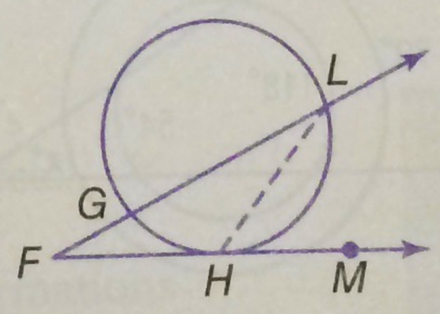
Prove: $m\angle A = \frac{1}{2}(m\overset{\frown}{DE} - m\overset{\frown}{BC})$



31. Case 2

Given: tangent $\overrightarrow{FM}$ and secant $\overrightarrow{FL}$

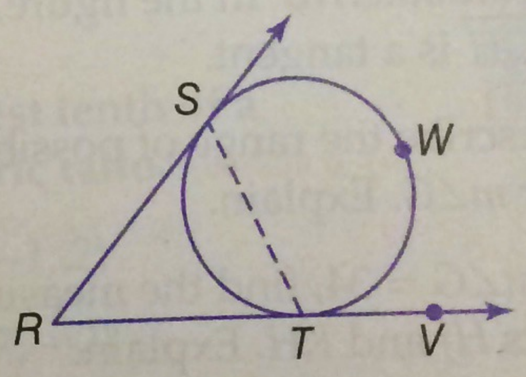
Prove: $m\angle F = \frac{1}{2}(m\overset{\frown}{LH} - m\overset{\frown}{GH})$



32. Case 3

Given: tangents $\overrightarrow{RS}$ and $\overrightarrow{RV}$

Prove: $m\angle R = \frac{1}{2}(m\overset{\frown}{SWT} - m\overset{\frown}{ST})$



33. PROOF Write a paragraph proof of Theorem 10.13.

a. Given: $\overleftrightarrow{AB}$ is a tangent of $\odot O$.
$\overrightarrow{AC}$ is a secant of $\odot O$.
$\angle CAE$ is acute.

$m\angle CAE = \frac{1}{2}m\overset{\frown}{CA}$