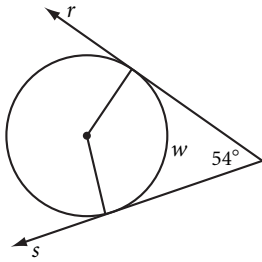


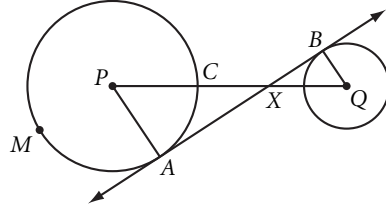
# Lesson 9.1 • Tangent Properties

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

1. Rays  $r$  and  $s$  are tangents.  $w =$  \_\_\_\_\_

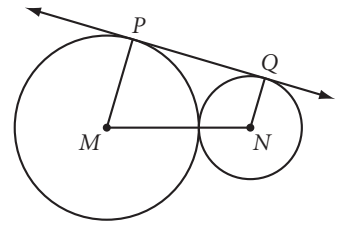


2.  $\overleftrightarrow{AB}$  is tangent to both circles and  $m\widehat{AMC} = 295^\circ$ .  $m\angle BQX =$  \_\_\_\_\_

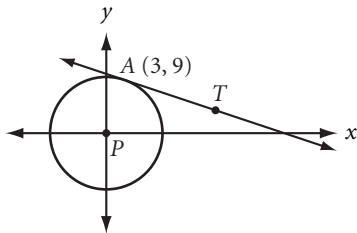


3.  $\overleftrightarrow{PQ}$  is tangent to two externally tangent noncongruent circles,  $M$  and  $N$ .

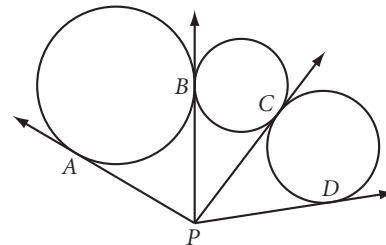
- a.  $m\angle NQP =$  \_\_\_\_\_,  $m\angle MPQ =$  \_\_\_\_\_  
 b. What kind of quadrilateral is  $MNQP$ ? Explain your reasoning.



4.  $\overleftrightarrow{AT}$  is tangent to circle  $P$ . Find the equation of  $\overleftrightarrow{AT}$ .



5.  $\overline{PA}$ ,  $\overline{PB}$ ,  $\overline{PC}$ , and  $\overline{PD}$  are tangents. Explain why  $\overline{PA} \cong \overline{PD}$ .



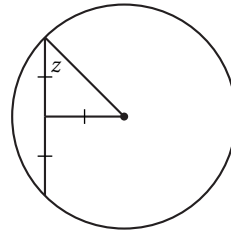
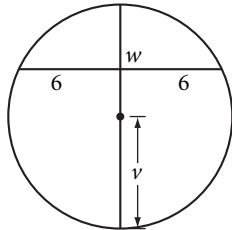
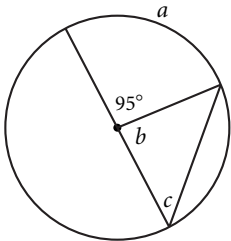
6. Circle  $A$  has diameter 16.4 cm. Circle  $B$  has diameter 6.7 cm.
- a. If  $A$  and  $B$  are internally tangent, what is the distance between their centers?
- b. If  $A$  and  $B$  are externally tangent, what is the distance between their centers?
7. Construct a circle,  $P$ . Pick a point,  $A$ , on the circle. Construct a tangent through  $A$ . Pick a point,  $T$ , on the tangent. Construct a second tangent to the circle through  $T$ .

# Lesson 9.2 • Chord Properties

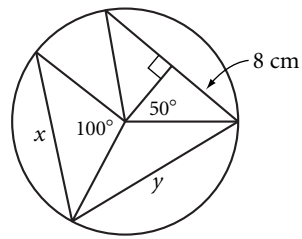
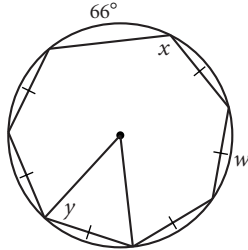
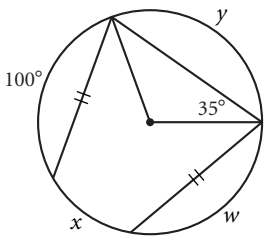
Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

In Exercises 1–6, find each unknown or write “cannot be determined.”

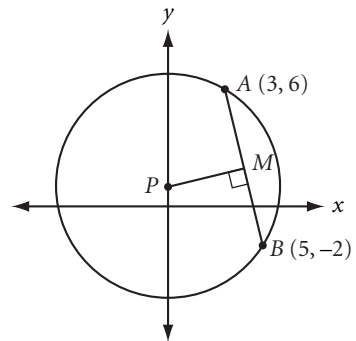
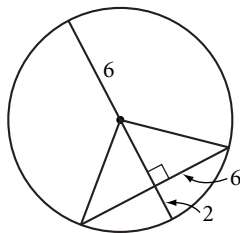
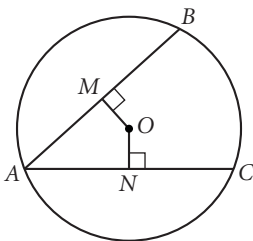
1.  $a = \underline{\hspace{1cm}}$ ,  $b = \underline{\hspace{1cm}}$ ,  $c = \underline{\hspace{1cm}}$       2.  $w = \underline{\hspace{1cm}}$ ,  $v = \underline{\hspace{1cm}}$       3.  $z = \underline{\hspace{1cm}}$



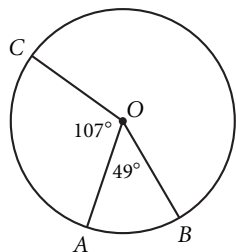
4.  $w = \underline{\hspace{1cm}}$ ,  $x = \underline{\hspace{1cm}}$ ,  $y = \underline{\hspace{1cm}}$       5.  $w = \underline{\hspace{1cm}}$ ,  $x = \underline{\hspace{1cm}}$ ,  $y = \underline{\hspace{1cm}}$       6.  $x = \underline{\hspace{1cm}}$ ,  $y = \underline{\hspace{1cm}}$



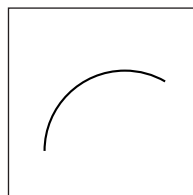
7.  $\overline{AB} \cong \overline{AC}$ .  $\overline{AMON}$  is a \_\_\_\_\_.  
Justify your answer.
8. What's wrong with this picture?
9. Find the coordinates of  $P$  and  $M$ .



10.  $m\widehat{AB} = \underline{\hspace{1cm}}$   
 $m\widehat{ABC} = \underline{\hspace{1cm}}$   
 $m\widehat{BAC} = \underline{\hspace{1cm}}$   
 $m\widehat{ACB} = \underline{\hspace{1cm}}$



11. Trace part of a circle onto patty paper. Fold to find the center. Explain your method.



# Lesson 9.3 • Arcs and Angles

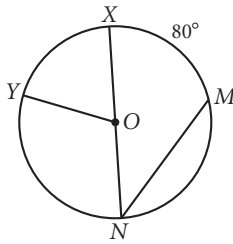
Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

1.  $m\widehat{XM} = 80^\circ$

$m\angle XNM = \underline{\hspace{2cm}}$

$m\widehat{XN} = \underline{\hspace{2cm}}$

$m\widehat{MN} = \underline{\hspace{2cm}}$

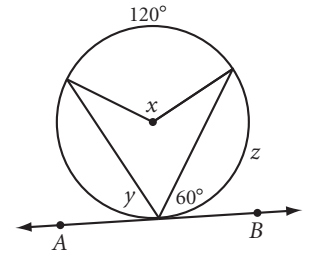


2.  $\overrightarrow{AB}$  is a tangent.

$x = \underline{\hspace{2cm}}$

$y = \underline{\hspace{2cm}}$

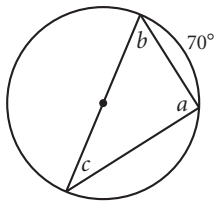
$z = \underline{\hspace{2cm}}$



3.  $a = \underline{\hspace{2cm}}$

$b = \underline{\hspace{2cm}}$

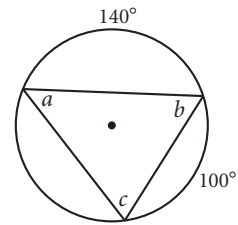
$c = \underline{\hspace{2cm}}$



4.  $a = \underline{\hspace{2cm}}$

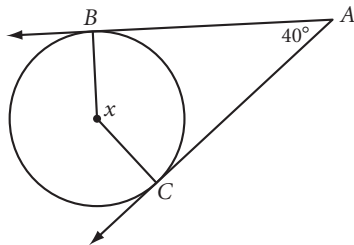
$b = \underline{\hspace{2cm}}$

$c = \underline{\hspace{2cm}}$



5.  $\overrightarrow{AB}$  and  $\overrightarrow{AC}$  are tangents.

$x = \underline{\hspace{2cm}}$



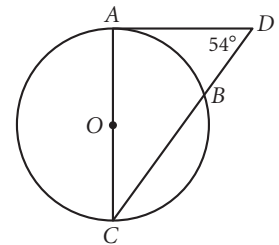
6.  $\overrightarrow{AD}$  is a tangent.  $\overline{AC}$  is a diameter.

$m\angle A = \underline{\hspace{2cm}}$

$m\widehat{AB} = \underline{\hspace{2cm}}$

$m\angle C = \underline{\hspace{2cm}}$

$m\widehat{CB} = \underline{\hspace{2cm}}$

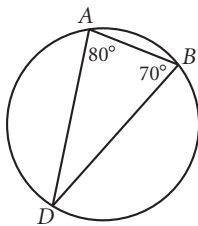


7.  $m\widehat{AD} = \underline{\hspace{2cm}}$

$m\angle D = \underline{\hspace{2cm}}$

$m\widehat{AB} = \underline{\hspace{2cm}}$

$m\widehat{DAB} = \underline{\hspace{2cm}}$

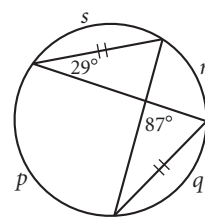


8.  $p = \underline{\hspace{2cm}}$

$q = \underline{\hspace{2cm}}$

$r = \underline{\hspace{2cm}}$

$s = \underline{\hspace{2cm}}$



9. Find the lettered angle and arc measures.  $\overrightarrow{AT}$  and  $\overrightarrow{AZ}$  are tangents.

$a = \underline{\hspace{2cm}}$

$b = \underline{\hspace{2cm}}$

$c = \underline{\hspace{2cm}}$

$d = \underline{\hspace{2cm}}$

$e = \underline{\hspace{2cm}}$

$f = \underline{\hspace{2cm}}$

$g = \underline{\hspace{2cm}}$

$h = \underline{\hspace{2cm}}$

$j = \underline{\hspace{2cm}}$

$k = \underline{\hspace{2cm}}$

$m = \underline{\hspace{2cm}}$

$n = \underline{\hspace{2cm}}$

