Name: _____ Date: _____ Block: _____

Chapter 9: Properties of Circles

Topic/Assignment		Turned in?
Ch 9 Vocabulary Puzzle		Yes No
Vocabulary and Properties of Tangents HW: Worksheet	I can use properties of a tangent to a circle to solve for missing values.	Yes No
Arc Measurements/ Properties of Chords HW: Worksheet	I can use angle measures to find arc measures. I can find the length of a chord and measure of an arc using relationships.	Yes No
Inscribed Angles and Polygons HW: Worksheet	I can find measures of angles and length of arcs for inscribed angles on circles.	Yes No
Ch 9 Quiz		
Angles in Circles HW: Worksheet	I can find the measures of angles inside or outside a circle.	Yes No
Segment Lengths in Circles HW: Worksheet	I can find the segment lengths in circles.	Yes No
Equations of Circles HW: Worksheet	I can write equations of circles in the coordinate plane.	Yes No
Ch 9 Review		Yes No

The Ch 9 Test is on _____.

**If *all* assignments are completed *by the day the Unit 10 test is given* you will receive 5 extra points on the test. **

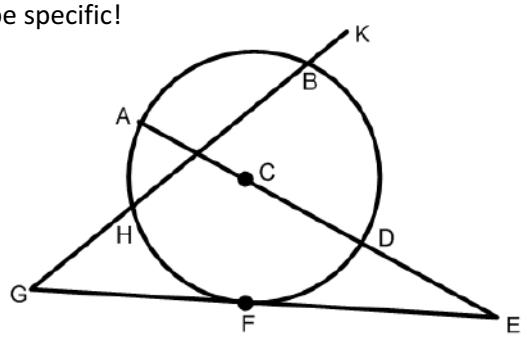
Name: _____ Date: _____ Block: _____

Circle Vocabulary and Concepts

Objective: Identify segments and lines related to circles.
Use properties of a tangent to a circle.

Term	Notes	Drawing
Circle: the set of all points in a plane that are equidistant from a given point called the **center** of the circle		
Radius: a segment whose endpoints are the center and any point on the circle. All radii of a circle are congruent.		
Chord: a segment whose endpoints are on a circle		
Diameter: a chord that contains the center of the circle		
Secant: a line that intersects a circle in two points		
Tangent: a line in the plane of a circle that intersects the circle in exactly one point (the *point of tangency*)		
Point of Tangency: the point where a tangent line intersects the circle		

EXAMPLE 1: Tell whether the line or segment is best described as a chord, a secant, a tangent, a diameter, or a radius—be specific!



a. $\overline{AD}$

b. $\overline{GE}$

c. $\overleftrightarrow{AE}$

d. $\overleftrightarrow{CA}$

e. $\overleftrightarrow{KG}$

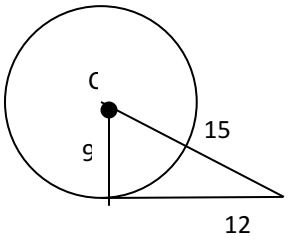
g. $\overline{HB}$

Name: _____ Date: _____ Block: _____

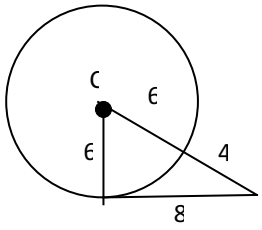
Term	Notes	Drawing
RULE: In a plane, a line is tangent to a circle if and only if the line is perpendicular to a radius of the circle at its endpoint on the circle		
RULE: Tangent segments from a common external point are congruent.		

EXAMPLE 2: Verifying a Tangent to a Circle. (Use the Pythagorean Theorem Converse!)

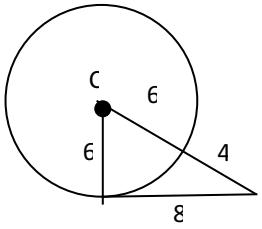
a.



b.

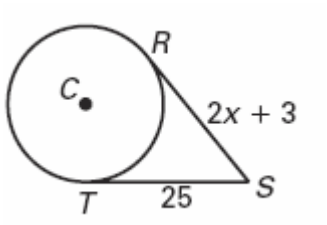


c.

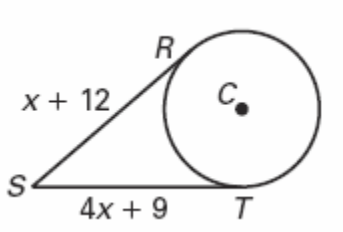


EXAMPLE 3: Using Properties of Tangents. Given: $\overline{SR}$ and $\overline{ST}$ are tangent to Circle C. Find the value of x.

a.



b.



Name: _____ Date: _____ Block: _____

Arc Measurement/ Properties of Chords

Objective: Use properties of arcs of circles
Use properties of chords of circles

Term	Notes	Drawing
Central Angle: an angle whose vertex is the center of a circle		
Minor Arc: part of a circle that measures less than 180^o		
Major Arc: part of a circle that measures between 180^o and 360^o		
Semicircle: an arc with endpoints that are the endpoints of a diameter of a circle. The measure of a semicircle is 180^o		
Measure of a Minor arc: the measure of the arc's central angle		
Measure of a Major arc: the difference between 360^o and the measure of the related minor arc		

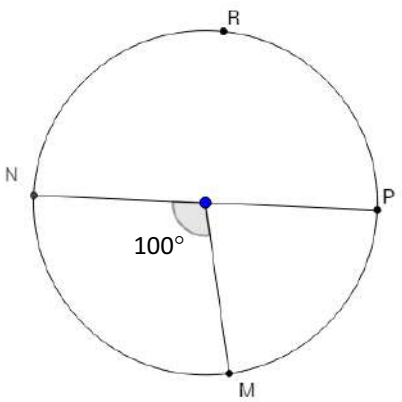
EXAMPLE 1: Finding measures of each arc of circle R. (NP is a diameter)

a. $\overset{\frown}{MN}$

b. $\overset{\frown}{MPN}$

c. $\overset{\frown}{PMN}$

d. $\overset{\frown}{PM}$



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Arc Addition Postulate The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs.	

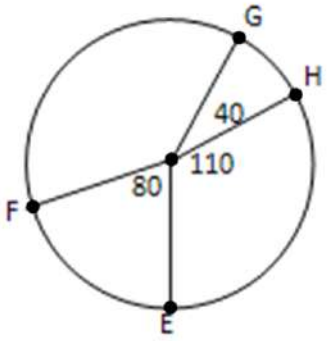
EXAMPLE 2: Finding the measures of Arcs

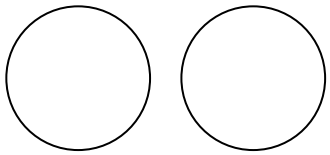
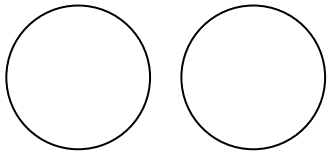
a. $\overset{\frown}{GE}$

b. $\overset{\frown}{GEF}$

c. $\overset{\frown}{GF}$

d. $\overset{\frown}{FHE}$

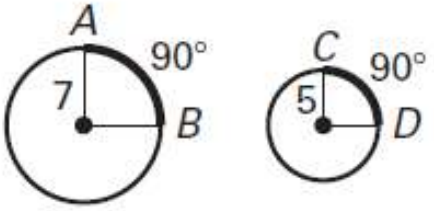


Congruent Circles: Two circles that have the same radius.		
Congruent Arcs: Two arcs that have the same measure. They are part of the same circle or congruent circles		

EXAMPLE 3: Tell whether the highlighted arcs are congruent. Explain why or why not.

a.

b.



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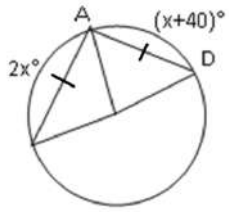
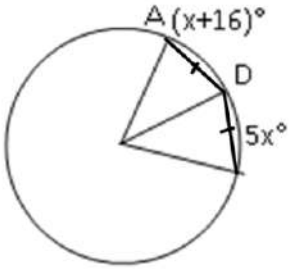
RULE: In the same circle, or in congruent circles, two minor arcs are congruent IF AND ONLY IF their corresponding chords are congruent.	
RULE: If one chord is a perpendicular bisector of another chord, then the first chord is a diameter.	
RULE: If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord and its arc.	

EXAMPLE 4:

a. Find $m\overset{\frown}{AD}$

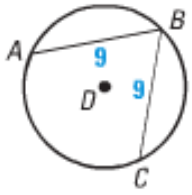


b. Find $m\overset{\frown}{AD}$

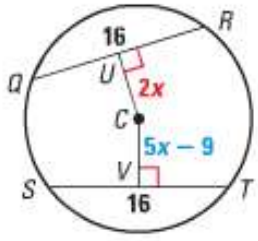


Use the diagram of $\odot D$.

1. If $m\overset{\frown}{AB} = 110°$, find $m\overset{\frown}{BC}$.
2. If $m\overset{\frown}{AC} = 150°$, find $m\overset{\frown}{AB}$.

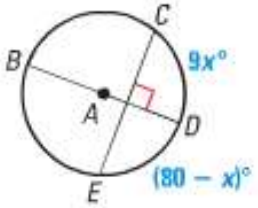


In the diagram of $\odot C$, $QR = ST = 16$. Find CU.



Find the measure of the indicated arc in the diagram.

3. $\overset{\frown}{CD}$
4. $\overset{\frown}{DE}$
5. $\overset{\frown}{CE}$



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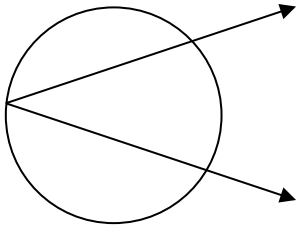
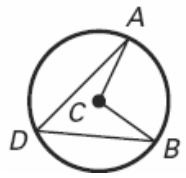
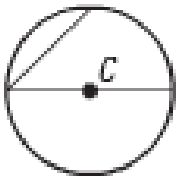
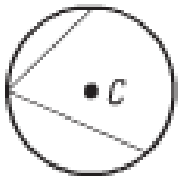
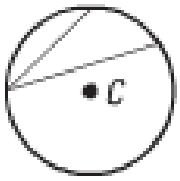
Inscribed Angles and Polygons

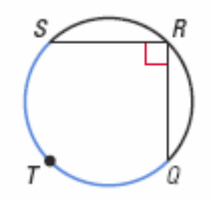
Inscribed angle: an angle whose vertex is on a circle and whose sides contain chords of the circle **Intercepted arc:** the arc that lies in the interior of an inscribed angle and has endpoints on the angle	
Measure of an Inscribed Angle: the measure of an inscribed angle is one half the measure of its intercepted arc	

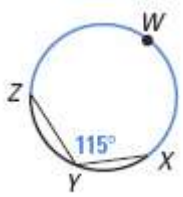


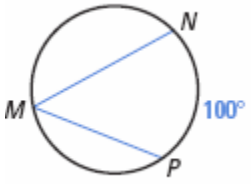




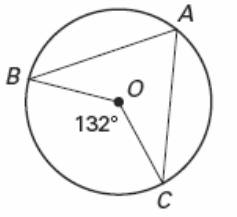
EXAMPLE 1: Finding the measure of each arc and inscribed angle.

A) 

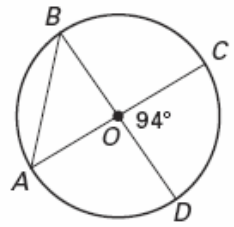
B) 

C) 

D) $m\angle BAC = \_?\_$



E) $m\angle BAC = \_?\_$



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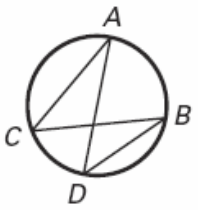
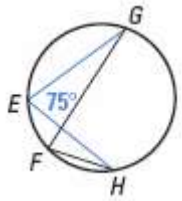
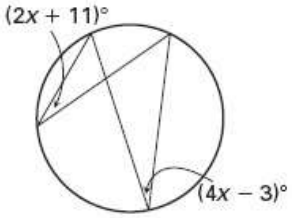
RULE: If two inscribed angles of a circle intercept the same arc, then the angles are congruent.	

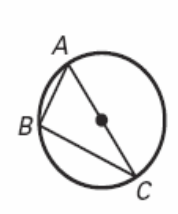
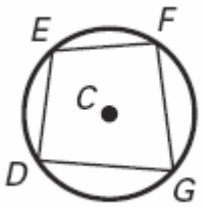
EXAMPLE 2: $m\angle E = 75°$. What is $m\angle F$?



b)

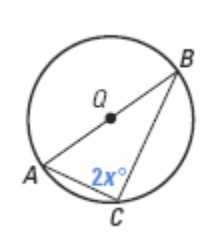


Inscribed Polygons.

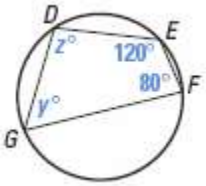
Right Triangle RULE: If a right triangle is inscribed in a circle, then the hypotenuse is a diameter of the circle. Conversely, if one side of an inscribed triangle is a diameter of the circle, then the triangle is a right triangle and the angle opposite the diameter is the right angle.	
Quadrilateral RULE: A quadrilateral can be inscribed in a circle if and only if its opposite angles are supplementary.	

EXAMPLE 3: Find the value of each variable.

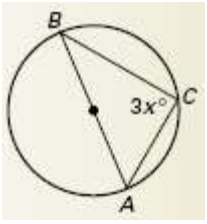
A)



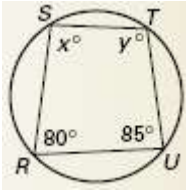
B)



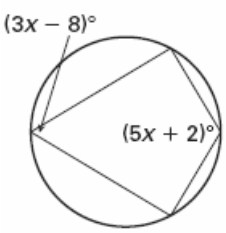
C)



D)



E)



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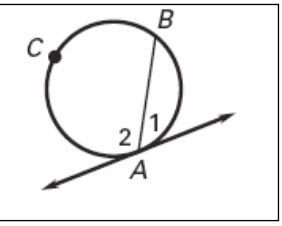
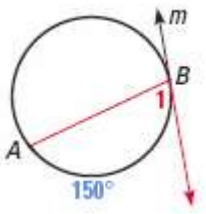
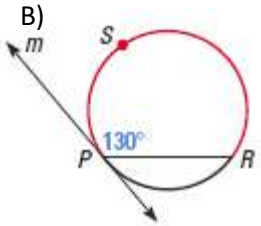
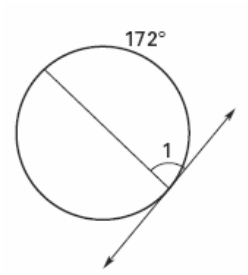
Other Angle Relationships in Circles

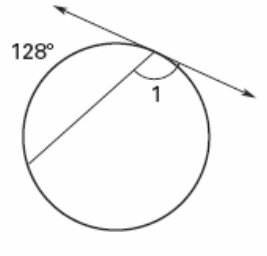
Tangent and Chord RULE: If a tangent and a chord intersect at a point on a circle, then the measure of each angle formed is one half the measure of its intercepted arc.	

EXAMPLE 1: Finding Angle and Arc Measures.

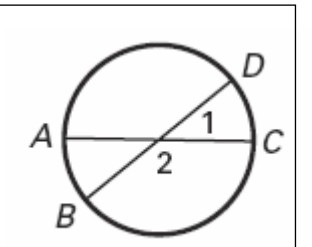
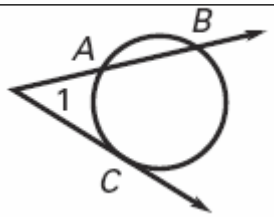
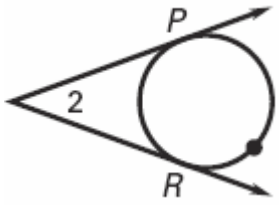
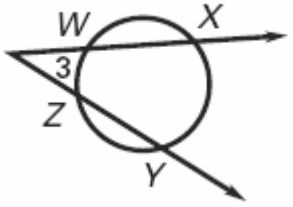
A) 

B) 

C) 

D) 

LINES INTERSECTING INSIDE OR OUTSIDE A CIRCLE.

Chords Intersect Inside the Circle/Angles Inside the Circle If two chords intersect *inside* a circle, then the measure of each angle is one half the *sum* of the measures of the arcs intercepted by the angle and its vertical angle.	
One Secant & One Tangent/Angles Outside the Circle If a tangent and a secant, two tangents, or two secants intersect *outside* a circle, then the measure of the angle formed is one half the *difference* of the measures of the intercepted arcs.	
Two Tangents/Angles Outside the Circle If a tangent and a secant, two tangents, or two secants intersect *outside* a circle, then the measure of the angle formed is one half the *difference* of the measures of the intercepted arcs.	
Two Secants/Angles Outside the Circle If a tangent and a secant, two tangents, or two secants intersect *outside* a circle, then the measure of the angle formed is one half the *difference* of the measures of the intercepted arcs.	

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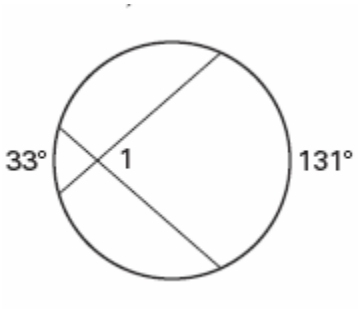
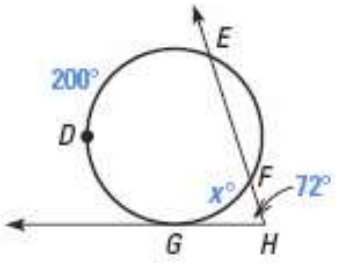
EXAMPLE 2:

A)

B)



C)



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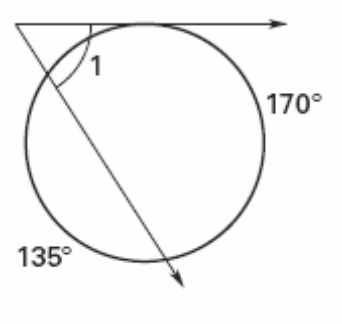

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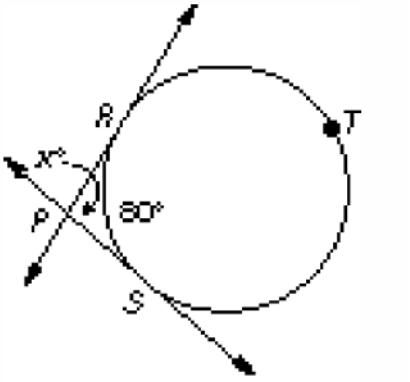

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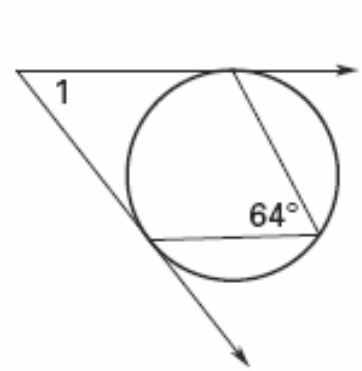

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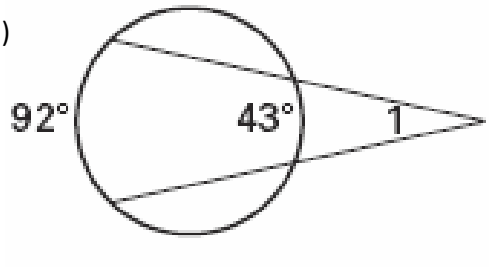

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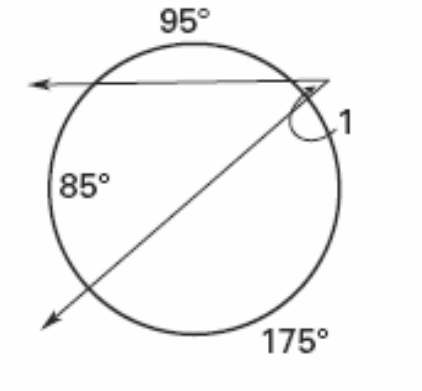

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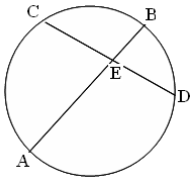
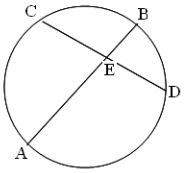
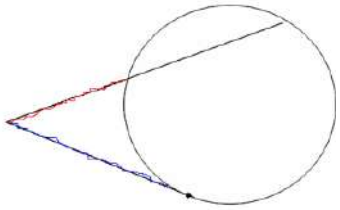
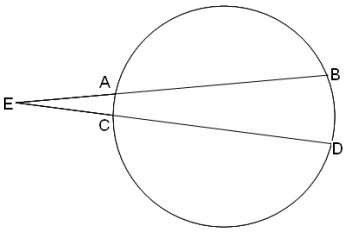
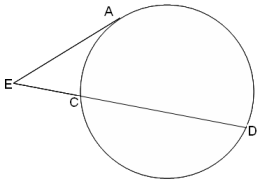
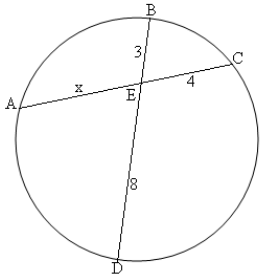
Segments in Circles

Chord Segments The two segments of each chord that are formed when two chords intersect in the interior of a circle.		
Segments of Chords If two chords intersect in the interior of a circle, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord.		
Secant/External Secant Segments A *secant segment* is a segment that contains a chord of a circle, and has exactly one endpoint outside the circle. The part of a secant segment that is outside the circle is called an *external segment.*		
Segments of Secants If two secant segments share the same endpoint outside a circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment.		
Segments of Secants and Tangents If a secant segment and a tangent segment share an endpoint outside a circle, then the product of the lengths of the secant segment and its external segment equals the square of the length of the tangent segment.		

EXAMPLES: Solve for x

a)



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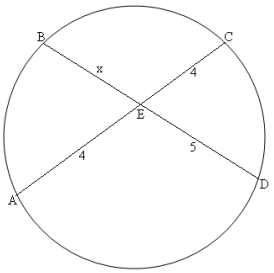

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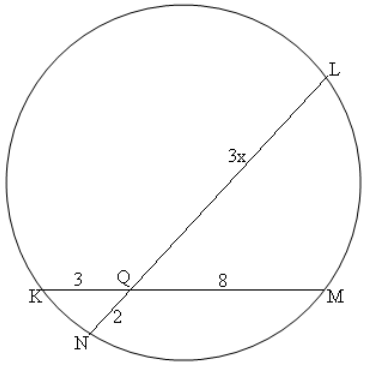

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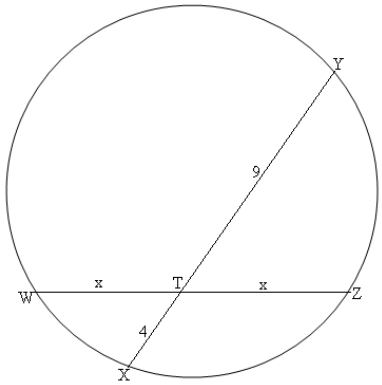

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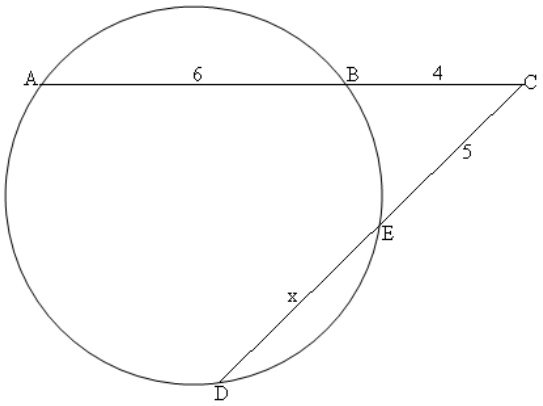

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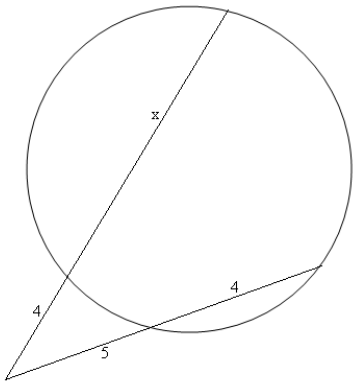

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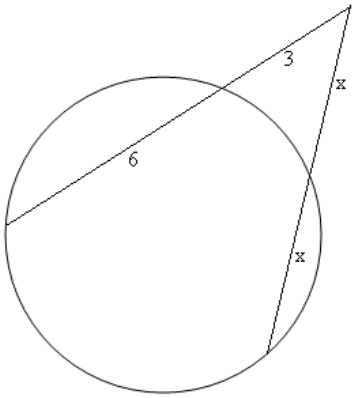

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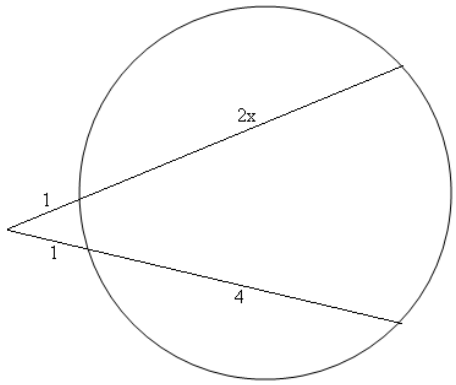

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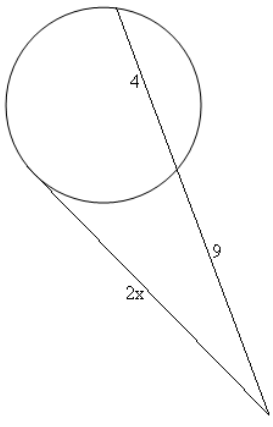

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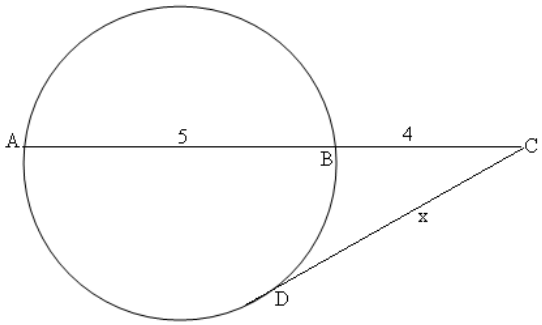

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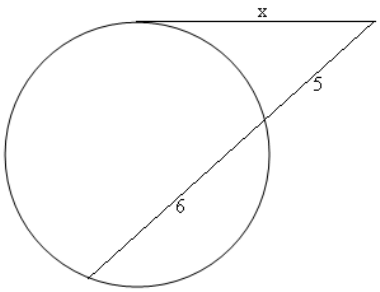
k)



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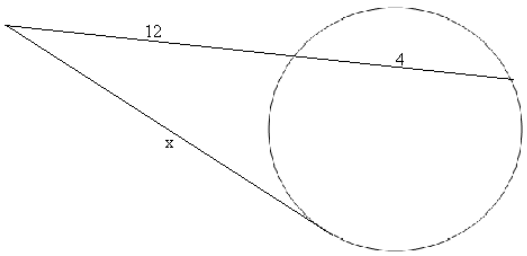

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Equation of the Circle

Objective: Write the equation of a circle. Use the equation of a circle and its graph to solve problems.

Equation of a Circle	

EXAMPLE 1: Write an equation of a circle with the given radius and center.

a. r = 5 (12 , 80)

b. r = 9 (6 , 12)

c. r = 12 (-1 , 15)

d. r = 4 (8 , -7)

EXAMPLE 2: Identify the center and radius of the following

a. $(x-6)^2+(y-24)^2=25$

b. $(x-9)^2+(y-42)^2=49$

c. $(x+8)^2+(y-17)^2=1$

d. $(x-10)^2+(y+9)^2=64$

EXAMPLE 3: Graphing an Equation of a Circle

a. $(x+3)^2+(y-2)^2=4$

b. $(x-3)^2+(y-1)^2=16$