MEA 2013-2014
Teacher: Claudia Valle
Start Date:

Course: Geometry B
Student: ________________
Completed Date:

Unit 5: Circles

Objectives: Students will understand how to identify the parts of a circle. Students will understand how to apply properties of circles to solve problems.

Essential Questions: What is the difference between central angles and inscribed angles? How can you use angles formed by segments and/or lines intersecting circles to solve problems? What are the components for the equation of a circle?

TEKS Standards: G.1.A, G.1.B, G.2.A, G.2.B, G.5.A, G.5.B, G.8.B, G.8.C, G.9.C

Geometry

(1) Geometric structure. The student understands the structure of, and relationships within, an axiomatic system. The student is expected to:

(A) develop an awareness of the structure of a mathematical system, connecting definitions, postulates, logical reasoning, and theorems;

(B) recognize the historical development of geometric systems and know mathematics is developed for a variety of purposes; and

(2) Geometric structure. The student analyzes geometric relationships in order to make and verify conjectures. The student is expected to:

(A) use constructions to explore attributes of geometric figures and to make conjectures about geometric relationships; and

(B) make conjectures about angles, lines, polygons, circles, and three-dimensional figures and determine the validity of the conjectures, choosing from a variety of approaches such as coordinate, transformational, or axiomatic.

(5) Geometric patterns. The student uses a variety of representations to describe geometric relationships and solve problems. The student is expected to:

(A) use numeric and geometric patterns to develop algebraic expressions representing geometric properties;

(B) use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles;

(8) Congruence and the geometry of size. The student uses tools to determine measurements of geometric figures and extends measurement concepts to find perimeter, area, and volume in problem situations. The student is expected to:

(B) find areas of sectors and arc lengths of circles using proportional reasoning;

(C) derive, extend, and use the Pythagorean Theorem;

(9) Congruence and the geometry of size. The student analyzes properties and describes relationships in geometric figures. The student is expected to:

(C) formulate and test conjectures about the properties and attributes of circles and the lines that intersect them based on explorations and concrete models; and

Turn In:

Assignment #	Activity	TEKS
31	Lines that Intersect Circles	G.1.A, G.2.A, G.2.B, G.9.C
32	Arcs and Chords	G.1.A, G.2.A, G.2.B, G.8.C, G.9.C
33	Sector Area and Arc Length	G.1.A, G.1.B, G.8.B, G.9.C
34	Inscribed Angles	G.1.A, G.2A, G.2.B, G.5.B, G.9.C
35	Angle Relationships in Circles	G.1.A, G.2.A, G.5.A, G.5.B, G.9.C
36	Segment Relationships in Circles	G.1.A, G.2.B, G.5.A
37	Circles in the Coordinate Plane	G.1.A, G.2.B, G.5.A
38	Unit 5 Test	G.1.A, G.1.B, G.2.A, G.2.B, G.5.A, G.5.B, G.8.B, G.8.C, G.9.C

Name ______________________ Date ______________ Class ______________

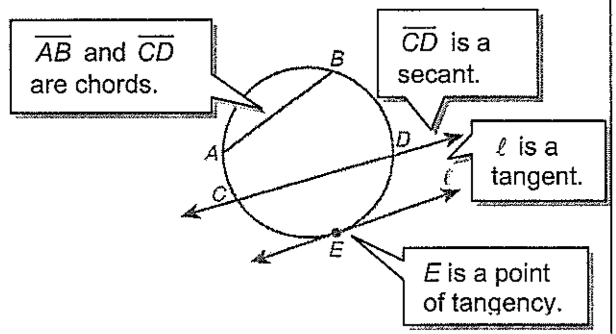
LESSON 11-1

Reteach

Lines That Intersect Circles

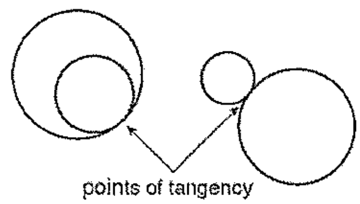
Lines and Segments That Intersect Circles

- A **chord** is a segment whose endpoints lie on a circle.
- A **secant** is a line that intersects a circle at two points.
- A **tangent** is a line in the same plane as a circle that intersects the circle at exactly one point, called the **point of tangency.**
- Radii and diameters also intersect circles.



Tangent Circles

Two coplanar circles that intersect at exactly one point are called **tangent circles.**



Identify each line or segment that intersects each circle.

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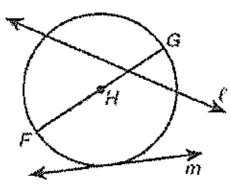

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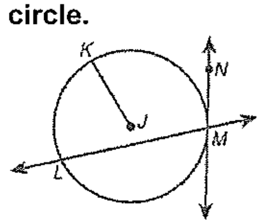

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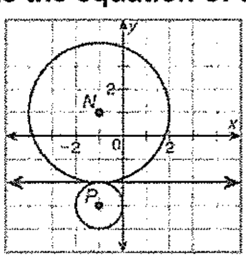
Find the length of each radius. Identify the point of tangency and write the equation of the tangent line at that point.

3.



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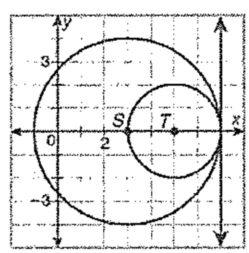
4.



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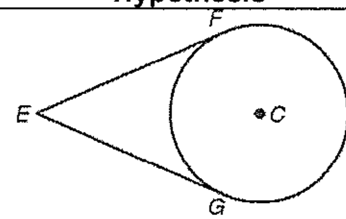
Name ______________________ Date ______________ Class ______________

LESSON 11-1

Reteach

Lines That Intersect Circles continued

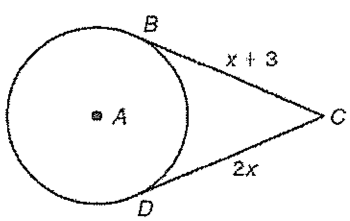
Theorem	Hypothesis	Conclusion
If two segments are tangent to a circle from the same external point, then the segments are congruent.	 $\overline{EF}$ and $\overline{EG}$ are tangent to $\odot C$.	$\overline{EF} \cong \overline{EG}$

In the figure above, $EF = 2y$ and $EG = y + 8$. Find EF.

$EF = EG$	2 segs. tangent to $\odot$ from same ext. pt. $\rightarrow$ segs. $\cong$.
$2y = y + 8$	Substitute $2y$ for EF and $y + 8$ for EG.
$y = 8$	Subtract y from each side.
$EF = 2(8)$	$EF = 2y$; substitute 8 for y.
$= 16$	Simplify.

The segments in each figure are tangent to the circle. Find each length.

5. BC



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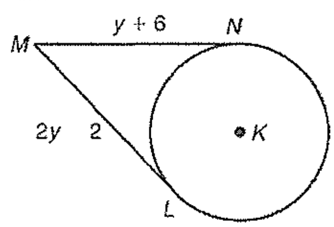
6. LM



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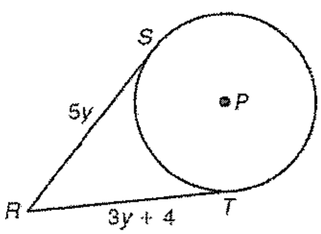
7. RS



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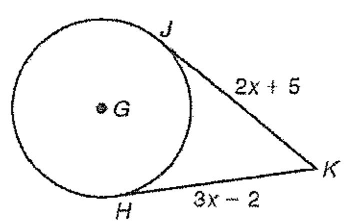
8. JK



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Name ______________________ Date ______________ Class ______________

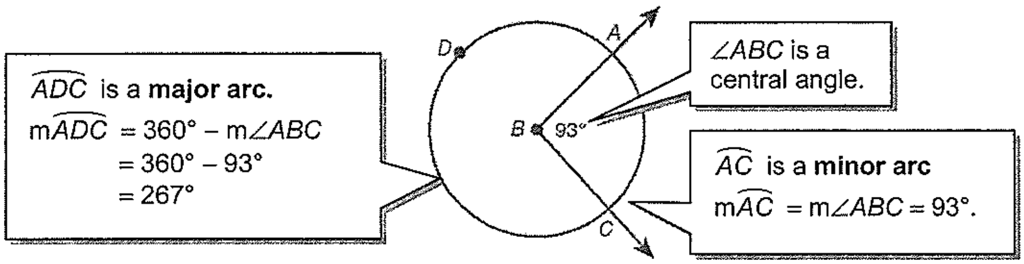
LESSON 11-2

Reteach

Arcs and Chords

Arcs and Their Measure

- A **central angle** is an angle whose vertex is the center of a circle.
- An **arc** is an unbroken part of a circle consisting of two points on a circle and all the points on the circle between them.

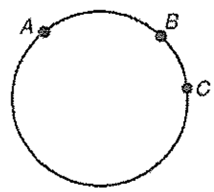


- If the endpoints of an arc lie on a diameter, the arc is a semicircle and its measure is 180°.

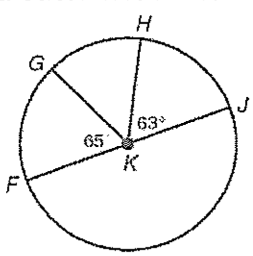
Arc Addition Postulate

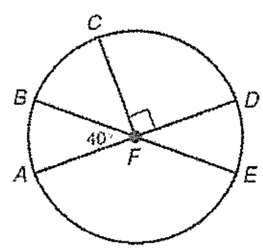
The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs.

$m\overset{\frown}{ABC} = m\overset{\frown}{AB} + m\overset{\frown}{BC}$

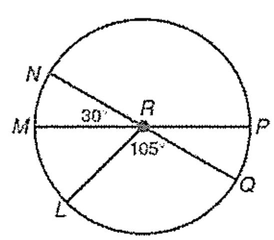


Find each measure.





1. $m\overset{\frown}{HJ}$ ______________________
2. $m\overset{\frown}{FGH}$ ______________________
3. $m\overset{\frown}{CDE}$ ______________________
4. $m\overset{\frown}{BCD}$ ______________________
5. $m\overset{\frown}{LMN}$ ______________________
6. $m\overset{\frown}{LNP}$ ______________________



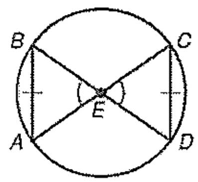
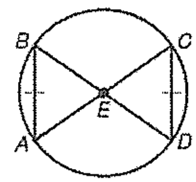
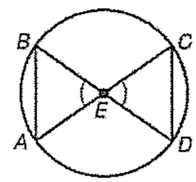
Name ______________________ Date ______________ Class ______________

LESSON 11-2

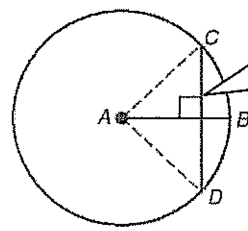
Reteach

Arcs and Chords continued

Congruent arcs are arcs that have the same measure.

Congruent Arcs, Chords, and Central Angles		
 If $m\angle BEA \cong m\angle CED$, then $\overline{BA} \cong \overline{CD}$.	 If $\overline{BA} \cong \overline{CD}$, then $\overset{\frown}{BA} \cong \overset{\frown}{CD}$.	 If $\overset{\frown}{BA} \cong \overset{\frown}{CD}$, then $m\angle BEA \cong m\angle CED$.
Congruent central angles have congruent chords.	Congruent chords have congruent arcs.	Congruent arcs have congruent central angles.

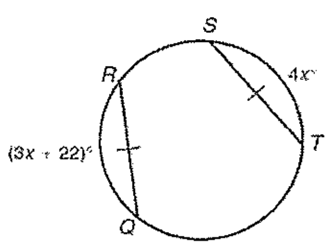
In a circle, if a radius or diameter is perpendicular to a chord, then it bisects the chord and its arc.



Since $\overline{AB} \perp \overline{CD}$, $\overline{AB}$ bisects $\overline{CD}$ and $\overset{\frown}{CD}$.

Find each measure.

7. $\overline{QR} \cong \overline{ST}$. Find $m\overset{\frown}{QR}$.



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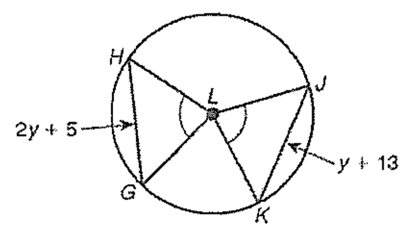
8. $\angle HLG \cong \angle KLJ$. Find GH.



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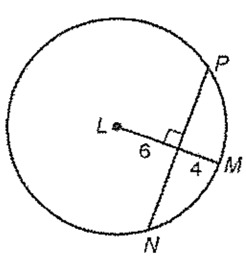
Find each length to the nearest tenth.

9. NP



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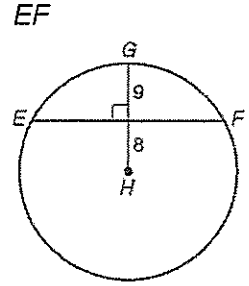
10. EF



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LESSON 11-3

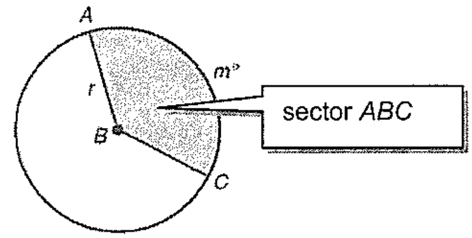
Reteach

Sector Area and Arc Length

Sector of a Circle

A **sector of a circle** is a region bounded by two radii of the circle and their intercepted arc.

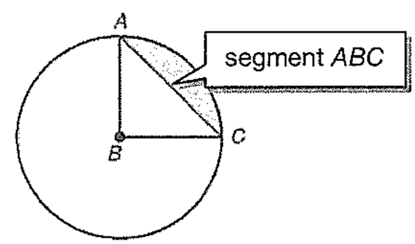
The area of a sector of a circle is given by the formula $A = \pi r^2 \left(\frac{m^\circ}{360^\circ}\right)$.



Segment of a Circle

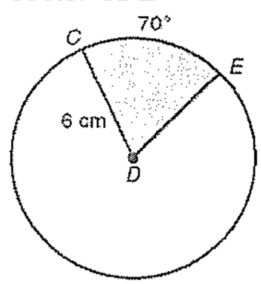
A **segment of a circle** is a region bounded by an arc and its chord.

area of segment *ABC* = area of sector *ABC* − area of ΔABC



Find the area of each sector. Give your answer in terms of π and rounded to the nearest hundredth.

1. sector *CDE*



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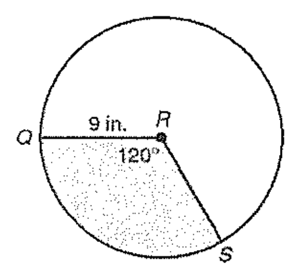
2. sector *QRS*



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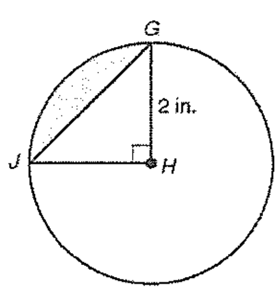
Find the area of each segment to the nearest hundredth.

3.



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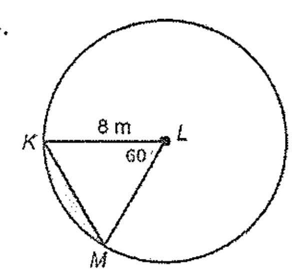

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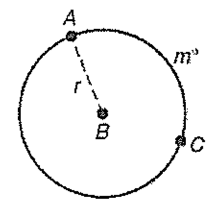
Name ______________________ Date ______________ Class ______________

LESSON 11-3

Reteach

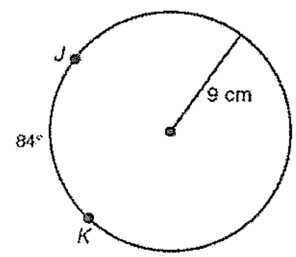
Sector Area and Arc Length continued

Arc Length
Arc length is the distance along an arc measured in linear units. The arc length of a circle is given by the formula $L = 2\pi r\left(\frac{m^\circ}{360^\circ}\right)$.



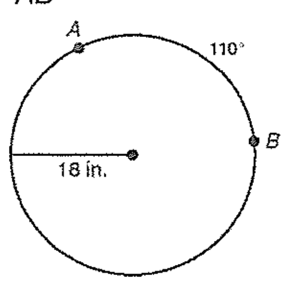
Find the arc length of $\widehat{JK}$.

$L = 2\pi r\left(\frac{m^\circ}{360^\circ}\right)$	Formula for arc length
$= 2\pi(9\text{ cm})\left(\frac{84^\circ}{360^\circ}\right)$	Substitute 9 cm for *r* and 84° for *m*°.
$= \frac{21}{5}\pi\text{ cm}$	Simplify.
$\approx 13.19\text{ cm}$	Round to the nearest hundredth.



Find each arc length. Give your answer in terms of π and rounded to the nearest hundredth.

5. $\widehat{AB}$



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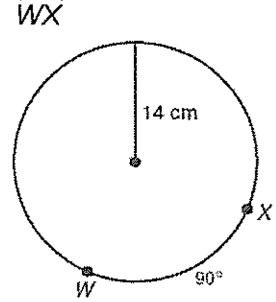
6. $\widehat{WX}$



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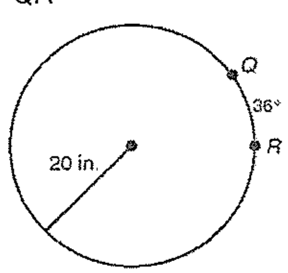
7. $\widehat{QR}$



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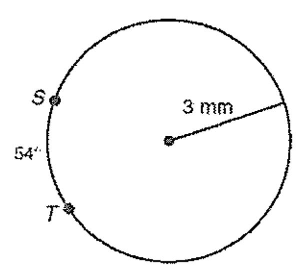
8. $\widehat{ST}$



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Name ______________________ Date ______________ Class ______________

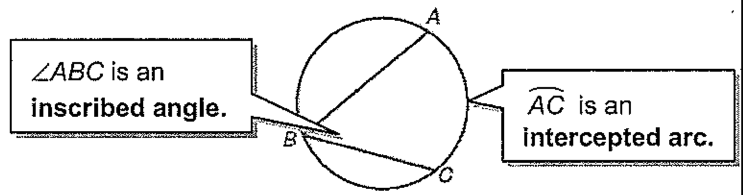
LESSON 11-4

Reteach

Inscribed Angles

Inscribed Angle Theorem

The measure of an inscribed angle is half the measure of its intercepted arc.

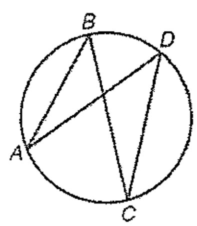


$$m\angle ABC = \frac{1}{2}m\overset{\frown}{AC}$$

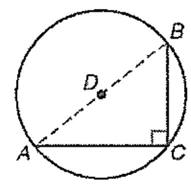
Inscribed Angles

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

$\angle ABC$ and $\angle ADC$ intercept $\overset{\frown}{AC}$, so $\angle ABC \cong \angle ADC$.

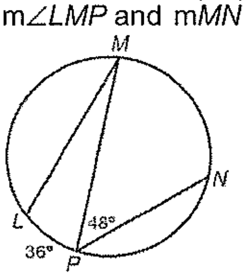


An inscribed angle subtends a semicircle if and only if the angle is a right angle.



Find each measure.

1. $m\angle LMP$ and $m\overset{\frown}{MN}$



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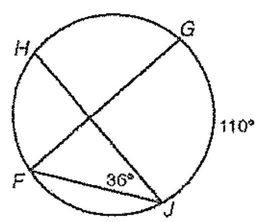
2. $m\angle GFJ$ and $m\overset{\frown}{FH}$



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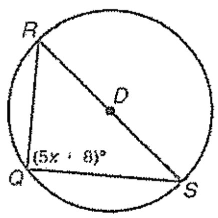
Find each value.

3. x



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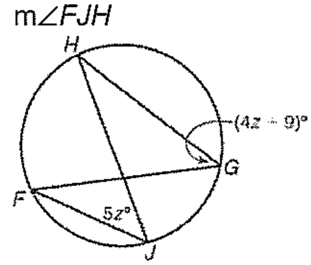
4. $m\angle FJH$



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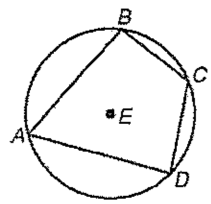
Name ______________________ Date ______________ Class ______________

LESSON 11-4

Reteach

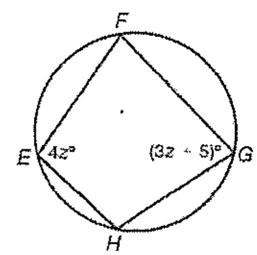
Inscribed Angles continued

Inscribed Angle Theorem	
If a quadrilateral is inscribed in a circle, then its opposite angles are supplementary.	 ∠A and ∠C are supplementary. ∠B and ∠D are supplementary. *ABCD* is inscribed in ⊙*E*.

Find m∠G.

Step 1 Find the value of *z*.

$m\angle E + m\angle G = 180°$	*EFGH* is inscribed in a circle.
$4z + 3z + 5 = 180$	Substitute the given values.
$7z = 175$	Simplify.
$z = 25$	Divide both sides by 7.



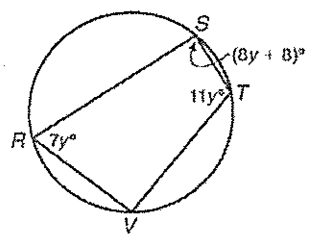
Step 2 Find the measure of ∠G.

$m\angle G = 3z + 5$

$= 3(25) + 5 = 80°$ Substitute 25 for *z*.

Find the angle measures of each quadrilateral.

5. *RSTV*



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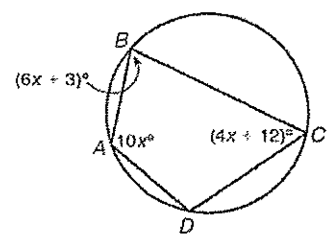
6. *ABCD*



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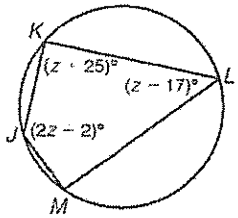
7. *JKLM*



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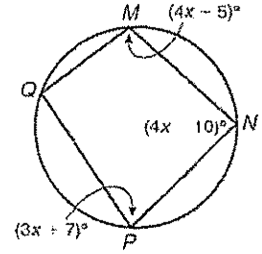
8. *MNPQ*



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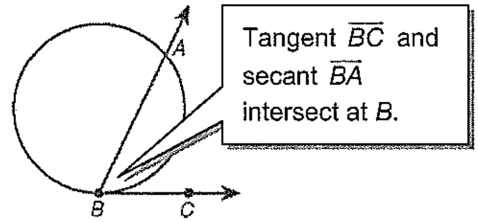
Name ______________________ Date ______________ Class ______________

LESSON 11-5

Reteach

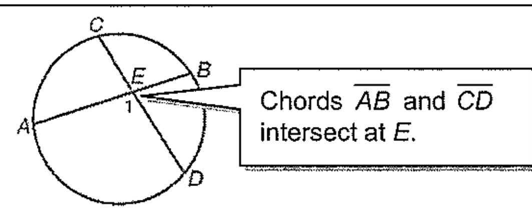
Angle Relationships in Circles

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.



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

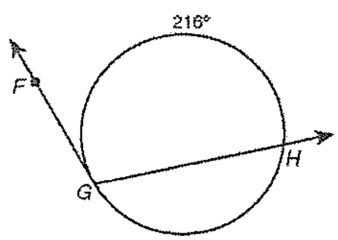
If two secants or chords intersect in the interior of a circle, then the measure of the angle formed is half the sum of the measures of its intercepted arcs.



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

Find each measure.

1. $m\angle FGH$



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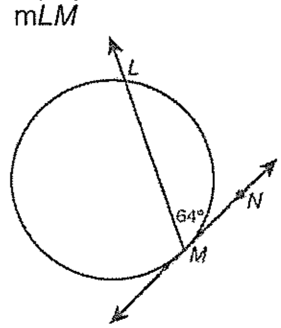
2. $m\widehat{LM}$



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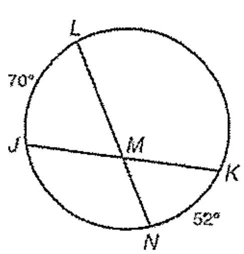
3. $m\angle JML$



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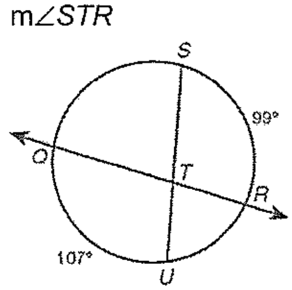
4. $m\angle STR$



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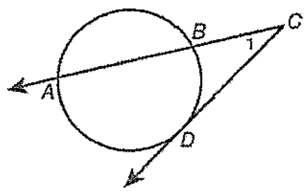
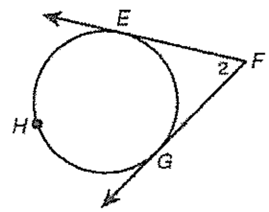
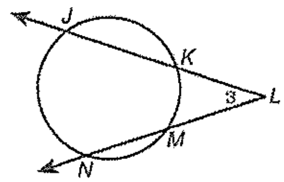
Name ______________________________ Date ______________ Class______________

LESSON 11-5

Reteach

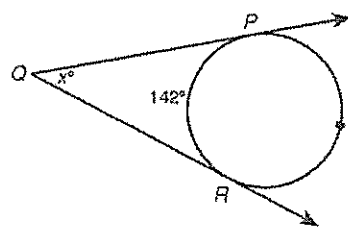
Angle Relationships in Circles continued

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
		
$m\angle 1 = \frac{1}{2}\left(m\widehat{AD} - m\widehat{BD}\right)$	$m\angle 2 = \frac{1}{2}\left(m\widehat{EHG} - m\widehat{EG}\right)$	$m\angle 3 = \frac{1}{2}\left(m\widehat{JN} - m\widehat{KM}\right)$

Find the value of *x*.

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



$$x° = \frac{1}{2}\left(m\widehat{PVR} - m\widehat{PR}\right)$$

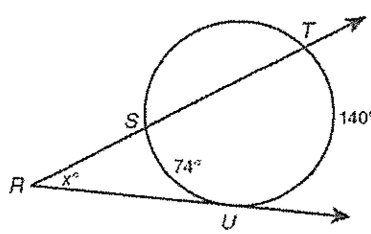
$$= \frac{1}{2}(218° - 142°)$$

$$x° = 38°$$

$$x = 38$$

Find the value of *x*.

5.



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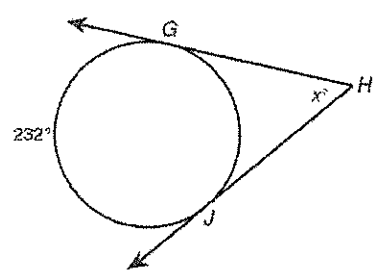

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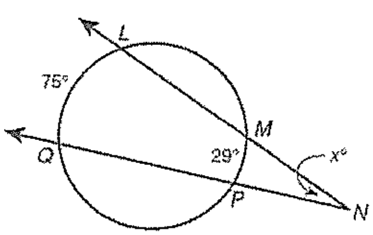

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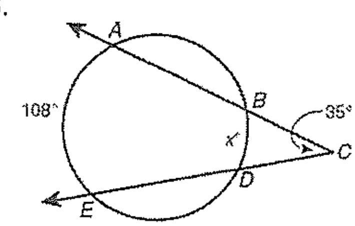

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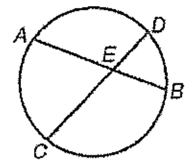
Name ________________________ Date ______________ Class______________

LESSON 11-6

Reteach

Segment Relationships in Circles

Chord-Chord Product Theorem	
If two chords intersect in the interior of a circle, then the products of the lengths of the segments of the chords are equal.	 $AE \cdot EB = CE \cdot ED$

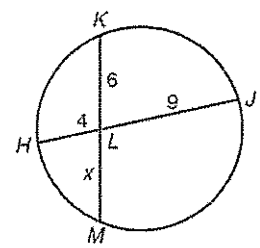
Find the value of x and the length of each chord.

$HL \cdot LJ = KL \cdot LM$	Chord-Chord Product Thm.
$4 \cdot 9 = 6 \cdot x$	$HL = 4$, $LJ = 9$, $KL = 6$, $LM = x$
$36 = 6x$	Simplify.
$6 = x$	Divide each side by 6.

$HJ = 4 + 9 = 13$

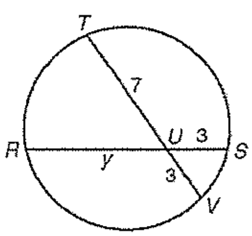
$KM = 6 + x$

$= 6 + 6 = 12$

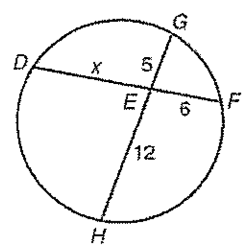


Find the value of the variable and the length of each chord.

1.



2.



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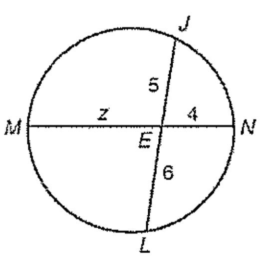
3.



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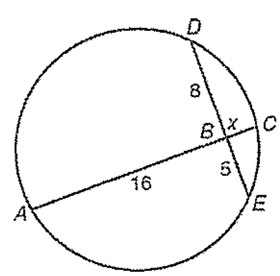

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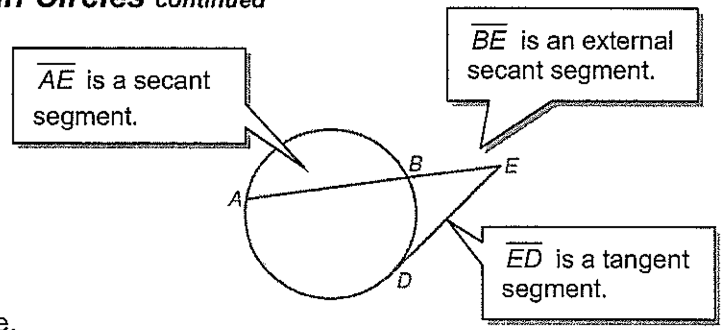
Name ______________________ Date ______________ Class ______________

LESSON 11-6

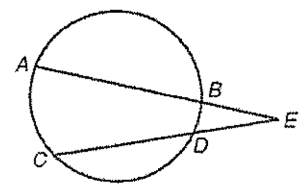
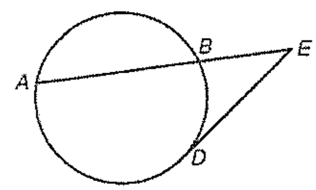
Reteach

Segment Relationships in Circles continued

- A **secant segment** is a segment of a secant with at least one endpoint on the circle.
- An **external secant segment** is the part of the secant segment that lies in the exterior of the circle.
- A **tangent segment** is a segment of a tangent with one endpoint on the circle.

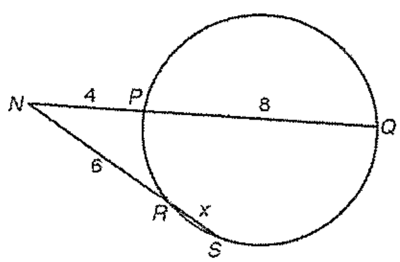


If two segments intersect outside a circle, the following theorems are true.

Secant-Secant Product Theorem 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. whole · outside = whole · outside $AE \cdot BE = CE \cdot DE$	
Secant-Tangent Product Theorem The product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. whole · outside = tangent^2 $AE \cdot BE = DE^2$	

Find the value of the variable and the length of each secant segment.

5.



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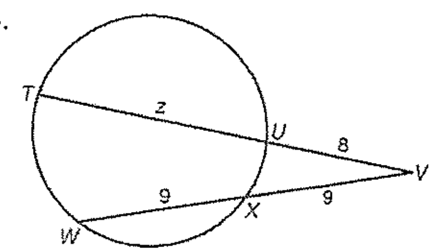
6.



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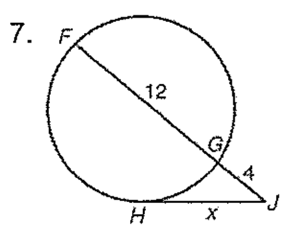
Find the value of the variable.

7.



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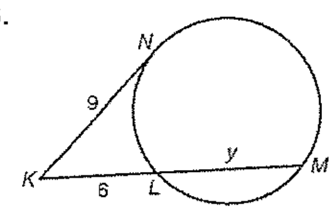

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Name ______________________ Date ______________ Class______________

LESSON 11-7

Reteach

Circles in the Coordinate Plane *continued*

You can use an equation to graph a circle by making a table or by identifying its center and radius.

Graph $(x - 1)^2 + (y + 4)^2 = 9$.

The equation of the given circle can be rewritten.

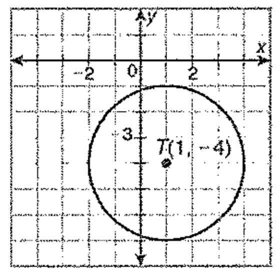
$$(x - h)^2 + (y - k)^2 = r^2$$

$$\downarrow \qquad \downarrow \qquad \downarrow$$

$$(x - 1)^2 + (y - (-4))^2 = 3^2$$

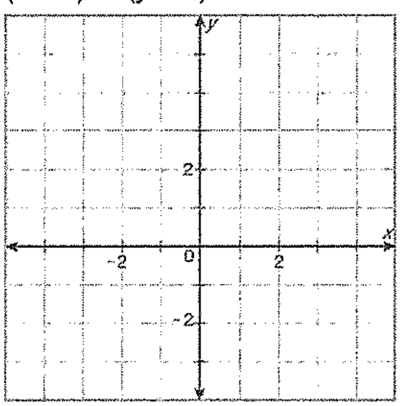
$h = 1$, $k = -4$, and $r = 3$

The center is at (h, k) or $(1, -4)$, and the radius is 3. Plot the point $(1, -4)$. Then graph a circle having this center and radius 3.

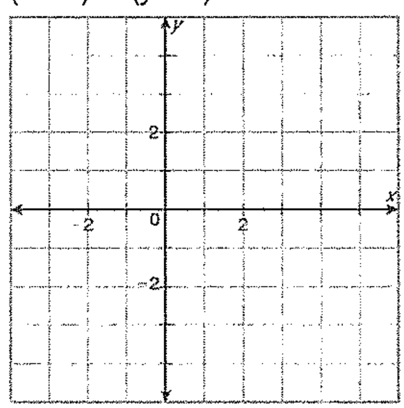


Graph each equation.

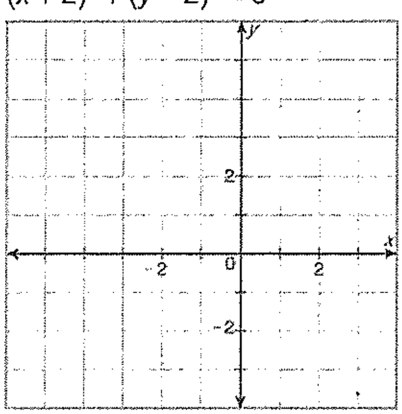
5. $(x - 1)^2 + (y - 2)^2 = 9$



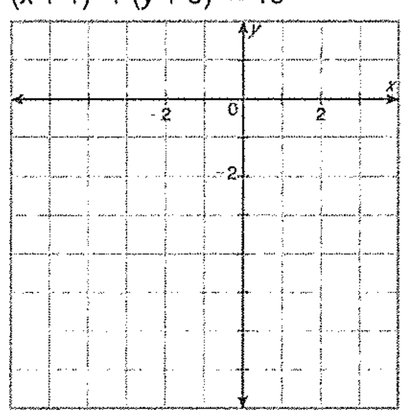
6. $(x - 3)^2 + (y + 1)^2 = 4$



7. $(x + 2)^2 + (y - 2)^2 = 9$



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



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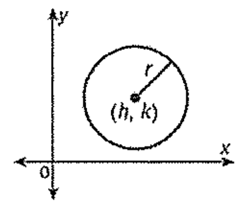
LESSON 11-7

Reteach

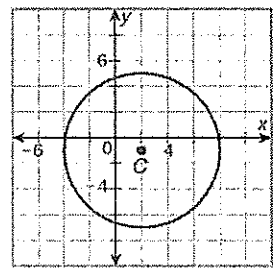
Circles in the Coordinate Plane

Equation of a Circle
The equation of a circle with center (h, k) and radius r is $(x-h)^2+(y-k)^2=r^2$.



Write the equation of ⊙*C* with center *C*(2, –1) and radius 6.

$(x-h)^2+(y-k)^2=r^2$	Equation of a circle
$(x-2)^2+(y-(-1))^2=6^2$	Substitute 2 for *h*, –1 for *k*, and 6 for *r*.
$(x-2)^2+(y+1)^2=36$	Simplify.



You can also write the equation of a circle if you know the center and one point on the circle.

Write the equation of ⊙*L* that has center *L*(3, 7) and passes through (1, 7).

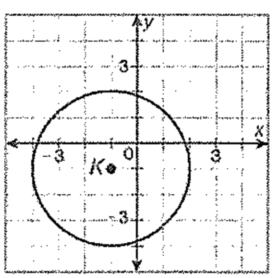
Step 1 Find the radius.

$r=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$	Distance Formula
$r=\sqrt{(1-3)^2+(7-7)^2}$	Substitution
$r=\sqrt{4}=2$	Simplify.

Step 2 Use the equation of a circle.

$(x-h)^2+(y-k)^2=r^2$	Equation of a circle
$(x-3)^2+(y-7)^2=2^2$	$(h, k)=(3, 7)$
$(x-3)^2+(y-7)^2=4$	Simplify.

Write the equation of each circle.

1. 

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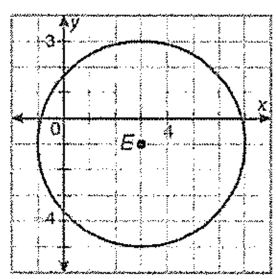
2. 

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3. ⊙*T* with center *T*(4, 5) and radius 8

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4. ⊙*B* that passes through (3, 6) and has center *B*(–2, 6)

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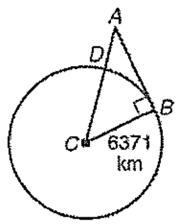
Name ______________________ Date ______________ Class ______________

LESSON 11-1

Problem Solving

Lines That Intersect Circles

1. The cruising altitude of a commercial airplane is about 9000 meters. Use the diagram to find *AB*, the distance from an airplane at cruising altitude to Earth's horizon. Round to the nearest kilometer.



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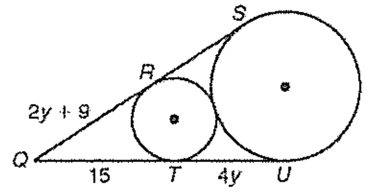
2. In the figure, segments that appear to be tangent are tangent. Find *QS*.



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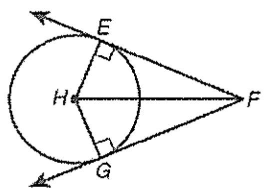
3. The area of $\odot H$ is 100π, and $HF = 26$ centimeters. What is the perimeter of quadrilateral *EFGH*?



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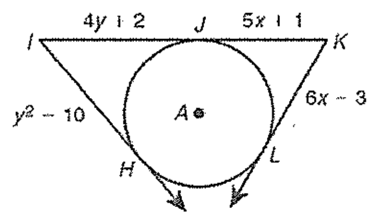
4. $\overline{IH}$, $\overline{IK}$, and $\overline{KL}$ are tangent to $\odot A$. What is *IK*?



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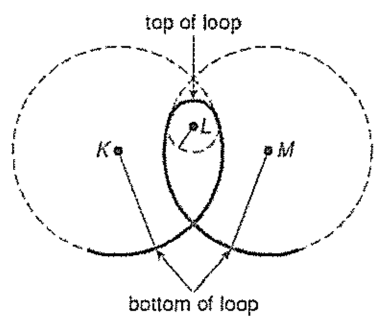
Choose the best answer.

5. A teardrop-shaped roller coaster loop is a section of a spiral in which the radius is constantly changing. The radius at the bottom of the loop is much larger than the radius at the top of the loop, as shown in the figure. Which is a true statement?



   A $\odot K$ and $\odot M$ have two points of tangency.

   B $\odot K$, $\odot L$, and $\odot M$ have one point of tangency.

   C $\odot L$ is internally tangent to $\odot K$ and $\odot M$.

   D $\odot L$ is externally tangent to $\odot K$ and $\odot M$.

6. $\odot G$ has center (2, 5) and radius 3. $\odot H$ has center (2, 0). If the circles are tangent, which line could be tangent to both circles?

   F $x = 2$ H $y = 2$

   G $x = 0$ J $y = 5$

7. The Hubble Space Telescope orbits 353 miles above Earth, and Earth's radius is about 3960 miles. Which is closest to the distance from the telescope to Earth's horizon?

   A 1634 mi C 3976 mi

   B 1709 mi D 5855 mi

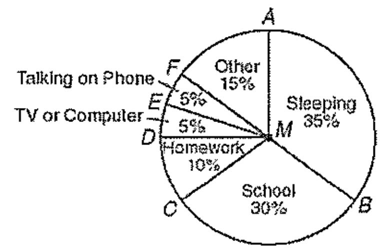
Name ____________________ Date __________ Class __________

LESSON 11-2

Practice A

Arcs and Chords

The circle graph shows the number of hours Rae spends on each activity in a typical weekday. Use the graph to find each of the following.

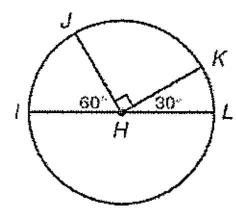


1. $m\angle AMD$ = ____________
2. $m\angle DMB$ = ____________
3. $m\widehat{BC}$ = ____________
4. $m\widehat{CBA}$ = ____________

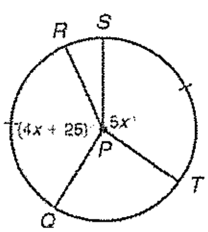
In Exercises 5–10, fill in the blanks to complete each postulate or theorem.

5. In a circle or congruent circles, congruent central angles have congruent ____________.
6. In a circle or congruent circles, congruent ____________ have congruent arcs.
7. The measure of an arc formed by two ____________ arcs is the sum of the measures of the two arcs.
8. In a circle, the ____________ of a chord is a radius (or diameter).
9. In a circle or congruent circles, congruent arcs have congruent ____________.
10. In a circle, if the ____________ is perpendicular to a chord, then it bisects the chord and its arc.

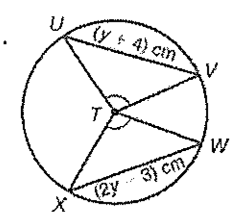
Find each measure.



11. $m\widehat{IK}$ = ____________
12. $m\widehat{JIL}$ = ____________

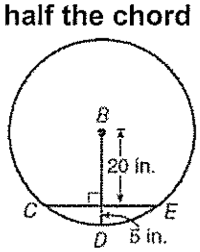
13. 

$m\widehat{QR} = m\widehat{ST}$. Find $m\angle QPR$. ____________

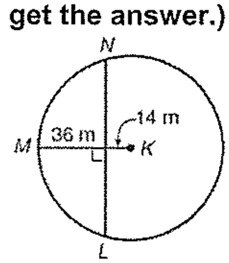
14. 

$\angle UTV \cong \angle XTW$. Find WX. ____________

Find the length of each chord. (*Hint:* Use the Pythagorean Theorem to find half the chord length, and then double that to get the answer.)

15. 

CE = __________

16. 

LN = __________

Name ______________________ Date ______________ Class ______________

LESSON 11-3

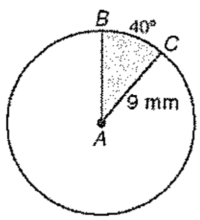
Practice A

Sector Area and Arc Length

In Exercises 1 and 2, fill in the blanks to complete each formula.

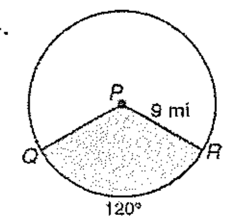
1. The area of a sector of a circle with radius r and central angle $m°$ is $A =$ ____________________.
2. The length of an arc with central angle $m°$ on a circle with radius r is $L =$ ____________________.

Find the area of each sector. Give your answer in terms of π and rounded to the nearest hundredth.

3. 

sector BAC

____

4. 

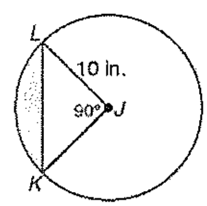
sector QPR

____

Different animals have different fields of view. Humans can generally see a 180° arc in front of them. Horses can see a 215° arc. A horse and rider are in heavy fog, so they can see for only 25 yards in any direction. Round your answers to Exercises 5 and 6 to the nearest square yard.

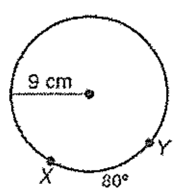
5. Find the area of the rider's field of view. ____________________
6. Find the area of the horse's field of view. ____________________

Complete Exercises 7–9 to find the area of segment *KJL*.

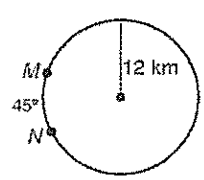


7. Find the area of sector KJL. Give your answer in terms of π. ____________________
8. Find the area of $\triangle KJL$. ____________________
9. Subtract the area of $\triangle KJL$ from the area of sector KJL to find the area of segment KJL. Round to the nearest hundredth. ____________________

Find each arc length. Give your answer in terms of π and rounded to the nearest hundredth.

10. 

$\overset{\frown}{XY}$ ____________________

11. 

$\overset{\frown}{MN}$ ____________________

Name ______________________ Date ______________ Class ______________

LESSON 11-4

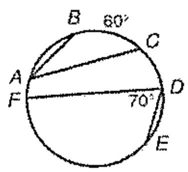
Practice A

Inscribed Angles

In Exercises 1–4, fill in the blanks to complete each theorem.

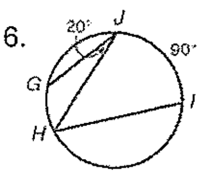
1. If a quadrilateral is inscribed in a circle, then its opposite angles are ____________________.
2. If inscribed angles of a circle intercept the same arc or are subtended by the same chord or arc, then the angles are ____________________.
3. The measure of an inscribed angle is ____________________ the measure of its intercepted arc.
4. An inscribed angle subtends a semicircle if and only if the angle is a ____________________.

Find each measure.

5. 

$m\angle BAC =$ __________

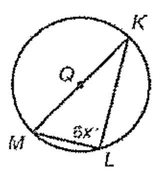
$m\widehat{FE} =$ __________

6. 

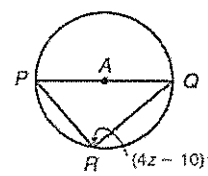
$m\angle IHJ =$ __________

$m\widehat{GH} =$ __________

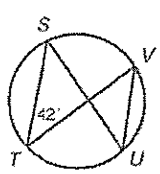
Find each value.

7. 

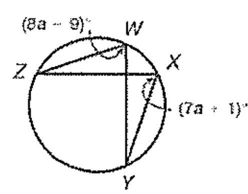
$x =$ __________

8. 

$z =$ __________

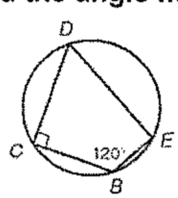
9. 

$m\angle VUS =$ __________

10. 

$m\angle ZWY =$ __________

Find the angle measures of each inscribed quadrilateral.

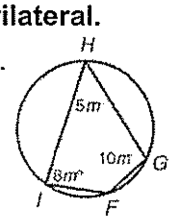
11. 

$m\angle B =$ __________

$m\angle C =$ __________

$m\angle D =$ __________

$m\angle E =$ __________

12. 

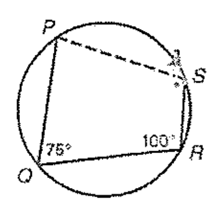
$m\angle F =$ __________

$m\angle G =$ __________

$m\angle H =$ __________

$m\angle I =$ __________

13. Iyla has not learned how to stop on ice skates yet, so she just skates straight across the circular rink until she hits a wall. She starts at *P*, turns 75° at *Q*, and turns 100° at *R*. Find how many degrees Iyla will turn at *S* to get back to her starting point.



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Name ______________________ Date ______________ Class ______________

LESSON 11-5

Practice A

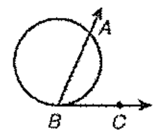
Angle Relationships in Circles

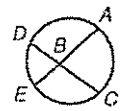
In Exercises 1–3, match the letter of the drawing to the formula for finding the measure of the angle.

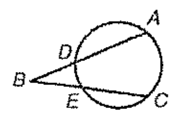
1. $m\angle ABC = \frac{1}{2}\left(m\widehat{AC} + m\widehat{DE}\right)$ ________

2. $m\angle ABC = \frac{1}{2}\left(m\widehat{AC} - m\widehat{DE}\right)$ ________

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

A. 

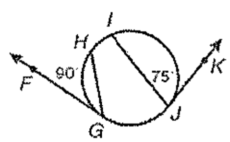
B. 

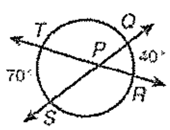
C. 

Find each measure.

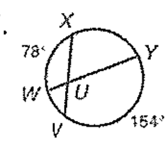
4. $m\angle FGH =$ ________

5. $m\widehat{IJ} =$ ________



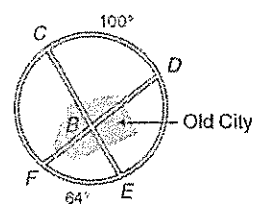
6. 

$m\angle QPR =$ ________

7. 

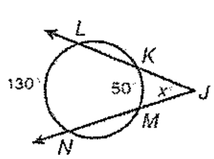
$m\angle YUV =$ ________

8. Some cities in Europe are thousands of years old. Often the small center of the old city is surrounded by a newer "ring road" that allows traffic to bypass the old streets. The figure shows a circular ring road and two roads that provide access to the old city. Find $m\angle CBD$.



____

Find the value of *x*.

9. 

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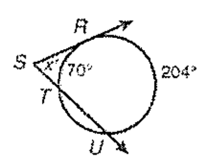
10. 

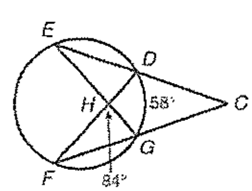
____

Complete Exercises 11–13 in order to find m∠*ECF*.

11. Find $m\angle DHG$. (*Hint:* $\overline{DF}$ is a straight segment.) ________

12. Find $m\widehat{EF}$. ________

13. Find $m\angle ECF$. ________



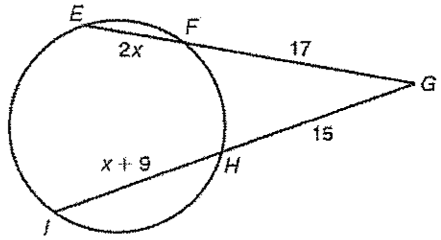
Name ______________________ Date ______________ Class ______________

LESSON 11-6

Problem Solving

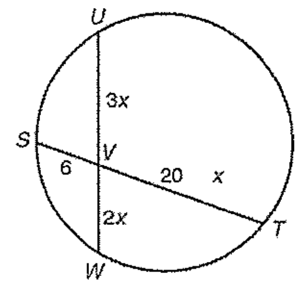
Segment Relationships in Circles

1. Find *EG* to the nearest tenth.



____

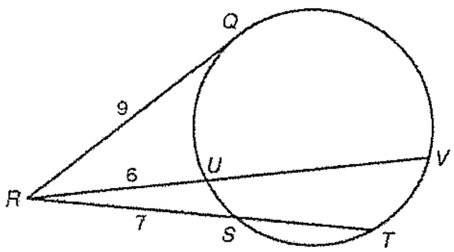
2. What is the length of $\overline{UW}$?



____

Choose the best answer.

3. Which of these is closest to the length of $\overline{ST}$?



A 4.6 C 7.5

B 5.4 D 11.6

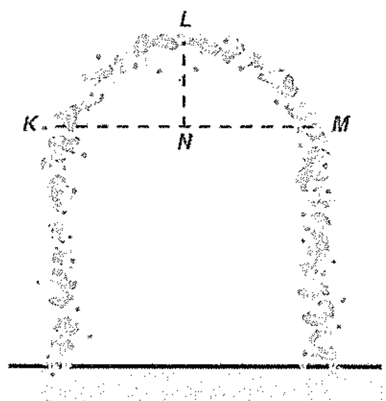
4. Floral archways like the one shown below are going to be used for the prom. $\overline{LN}$ is the perpendicular bisector of $\overline{KM}$. *KM* = 6 feet and *LN* = 2 feet. What is the diameter of the circle that contains $\overset{\frown}{KM}$?

F 4.5 ft

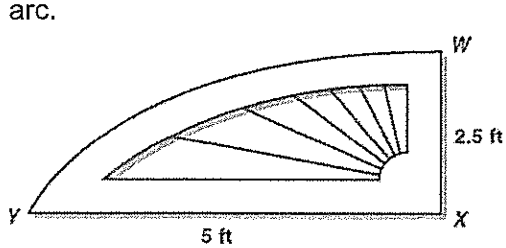
G 5.5 ft

H 6.5 ft

J 8 ft



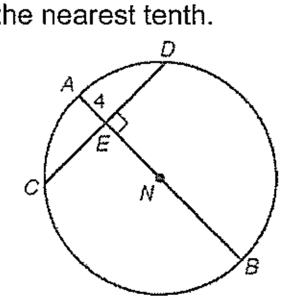
5. The figure is a "quarter" wood arch used in architecture. $\overline{WX}$ is the perpendicular bisector of the chord containing $\overline{YX}$. Find the diameter of the circle containing the arc.



A 5 ft C 10 ft

B 8.5 ft D 12.5 ft

6. In ⊙*N*, *CD* = 18. Find the radius of the circle to the nearest tenth.



F 12.1 H 20.3

G 16.3 J 24.3

Name ______________________ Date ______________ Class ______________

LESSON 11-7

Practice A

Circles in the Coordinate Plane

1. Write the equation of a circle with center (h, k) and radius r. ______________

Write the equation of each circle.

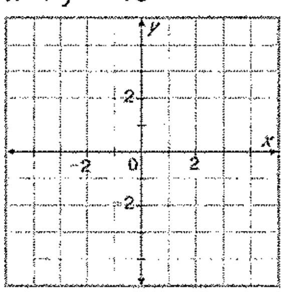
2. $\odot A$ centered at the origin with radius 6 ______________
3. $\odot D$ with center $D(3, 3)$ and radius 2 ______________
4. $\odot L$ with center $L(-3, -3)$ and radius 1 ______________
5. $\odot M$ with center $M(0, -2)$ and radius 9 ______________
6. $\odot Q$ with center $Q(7, 0)$ and radius 3 ______________

Complete Exercises 7 and 8 to write the equation of $\odot F$ with center $F(2, -1)$ that passes through (10, 5).

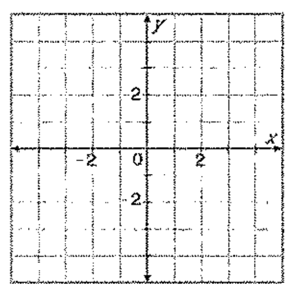
7. Use the distance formula with the two given points to find the radius of $\odot F$. ______________
8. Write the equation of $\odot F$. ______________

Graph each equation. First locate the center point, and use the radius to plot four points around the center that lie on the circle. Then draw a circle through the four points.

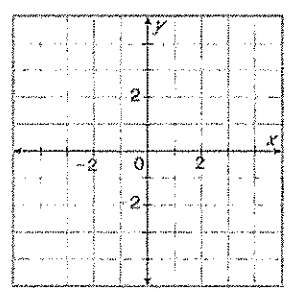
9. $x^2 + y^2 = 16$



10. $x^2 + y^2 = 4$



A county planning department is meeting to choose the location of a rural fire station. The fire station needs to be the same distance from each of the three towns it will serve. The towns are located at $A(-3, 2)$, $B(-3, -4)$, and $C(1, -4)$. Complete Exercises 11–13 in order to find the best location for the fire station.



11. Plot A, B, and C. Draw $\triangle ABC$.
12. Draw the perpendicular bisectors of $\overline{AB}$ and $\overline{BC}$.
13. The intersection point of the perpendicular bisectors is the same distance from the three points. So it is the center of a circle that intersects A, B, and C. Find the coordinates where the fire station should be built. ______________