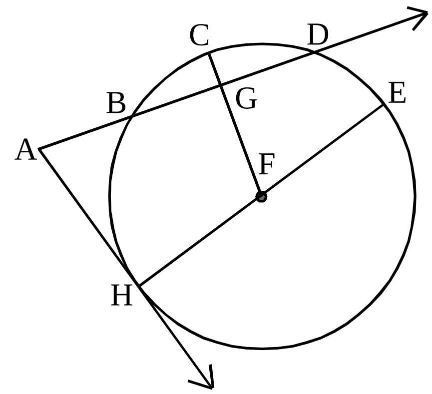
Circle Review

Geometry 6.1

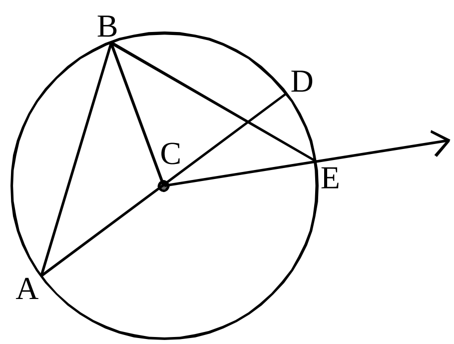
Name each part of the circle below:



1. Name two chords.
2. Name one diameter.
3. Name three radii.
4. Name one tangent.
5. Name two semicircles.
6. Name nine minor arcs.
7. Name one major arc.
8. Draw a circle concentric to circle F.

Central Angles have vertices at the center of the circle and endpoints on its circumference.

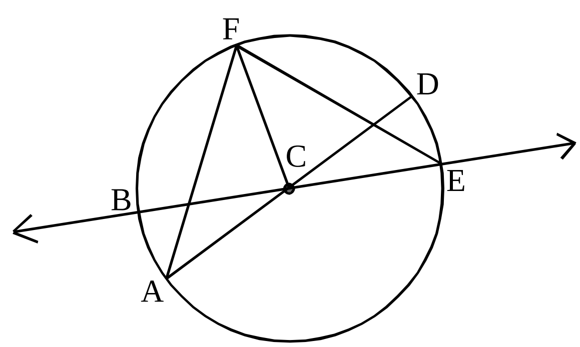
Name all of the central angles in circle C below:



Central angles and the arcs they define have equal measures.

Inscribed Angles have vertices and endpoints on a circle's circumference.

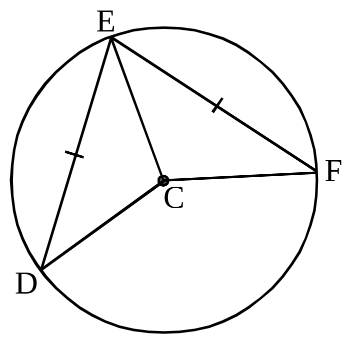
Name all of the inscribed angles in circle C below:

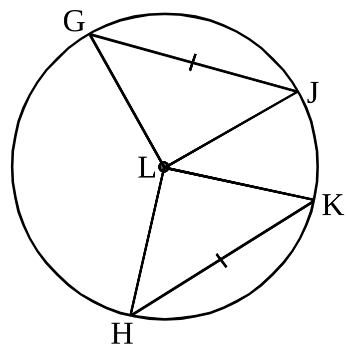


Chord Properties

Geometry 6.1

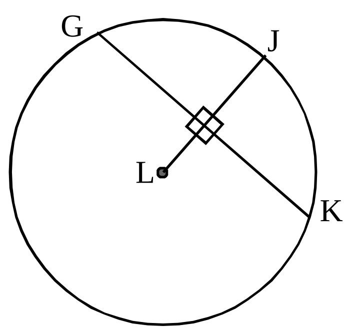
Explain why: (informal proof)
Congruent chords define congruent arcs/central angles.





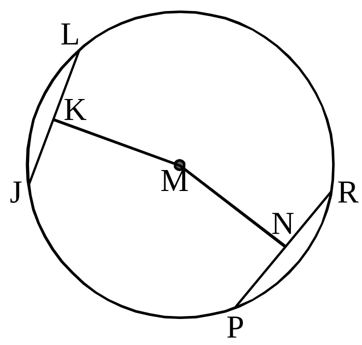
If two chords on the same circle are congruent, then the arcs and central angles defined by them will be _____________.

Explain why: (informal proof)
The radius perpendicular to a given chord bisects it.



Is the converse true?

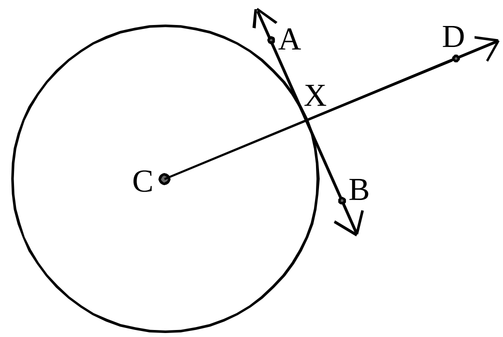
Explain why: (informal proof)
Congruent chords are equidistant from the center of the circle.
Given: Congruent chords $\overline{JL}$ and $\overline{PR}$.



Tangent Properties

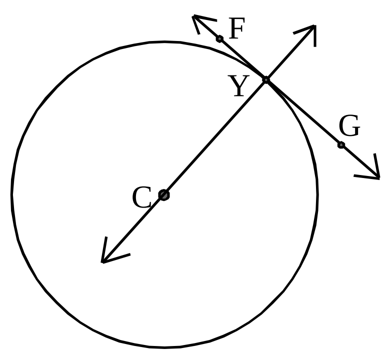
Geometry 6.2

1. Construct a circle with center C.
Draw radius $\overline{CX}$ so that X is the midpoint of segment $\overline{CD}$.
Construct the perpendicular bisector to segment $\overline{CD}$ through point X and label it line $\overleftrightarrow{AB}$.

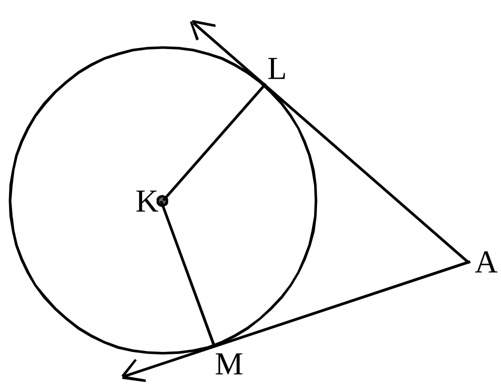


AB should be tangent to circle C. Complete the satement below about tangent lines:

A tangent to a circle will be ________ to the radius drawn to the point of tangency.
Try the opposite:
2. Construct tangent line FG on circle C so that Y is the point of tangency.
Construct a line perpendicular to line FG through Y.
Does the line you constructed pass through the circle center?



3. Construct circle K.
Construct tangent lines AL and AM with L and M on circle K.
What do you notice about Segments AL and AM?



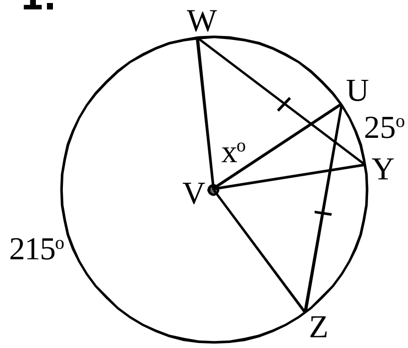
Name________________________ Period _____

Chords and Tangents Practice

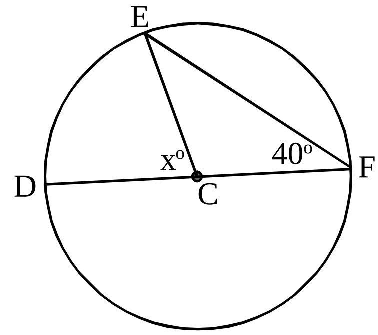
Geometry 6.2

Determine the length or measure of each x labeled below:

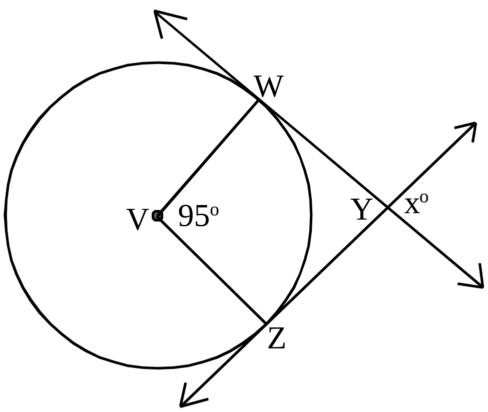
1.



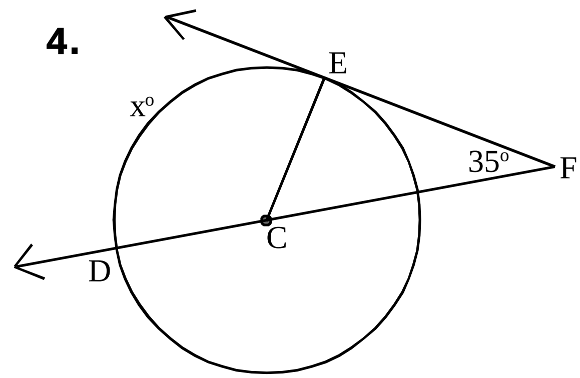
2.



3.

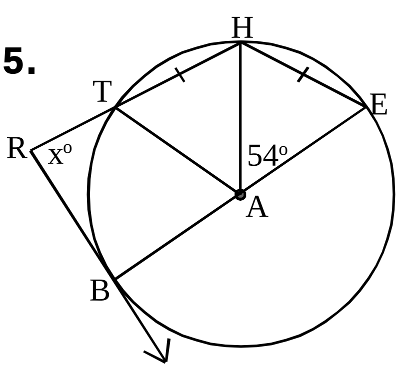


4.

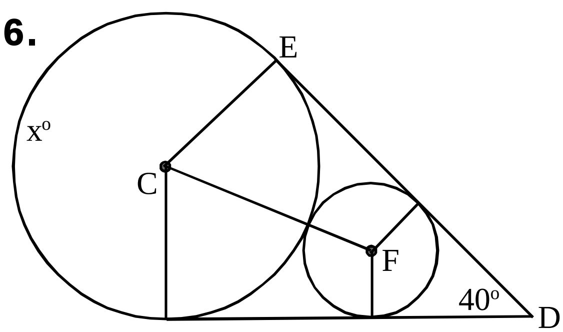


Determine the length or measure of each x labeled below:

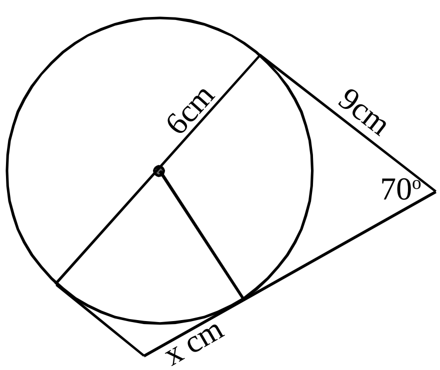
5.



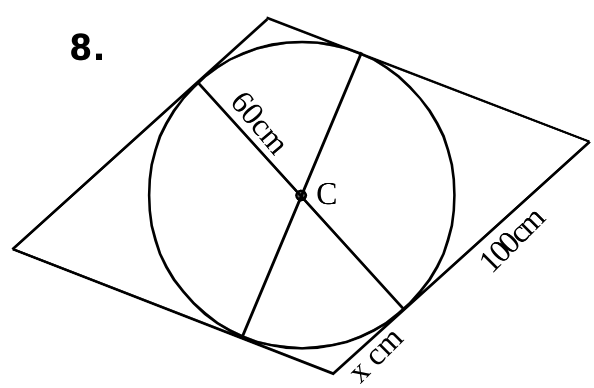
6.



7.



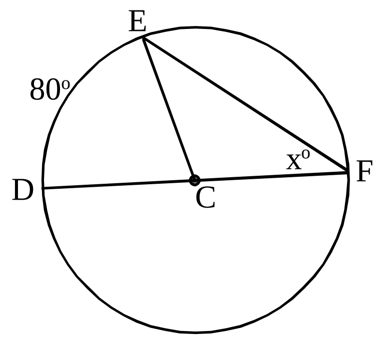
8.



Arcs and Angles

Inscribed Angles

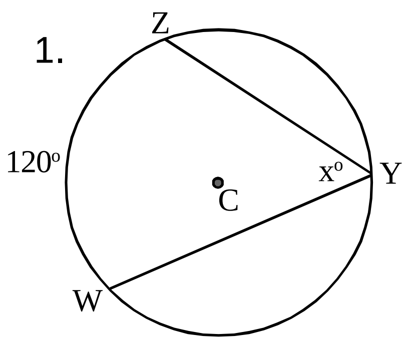
Compare the measure of the inscribed angle below to the intercepted arc.



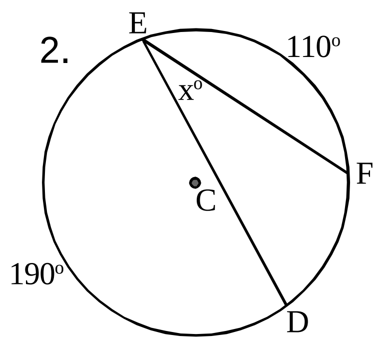
The same holds true for all angles inscribed in a circle (the proof is more difficult when the angle does not pass through the circle center).

Find each angle measure x:

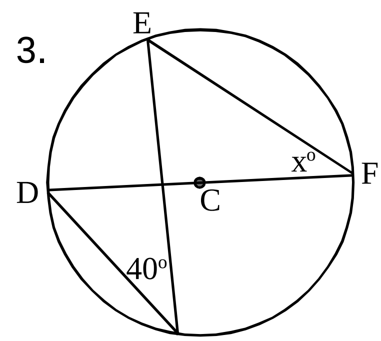
1.



2.

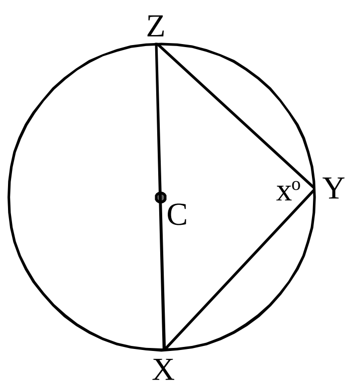


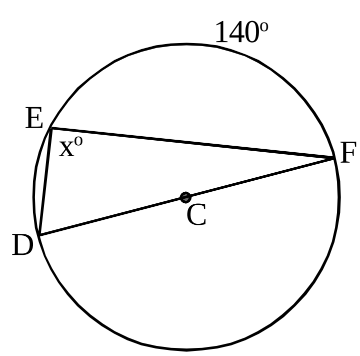
3.

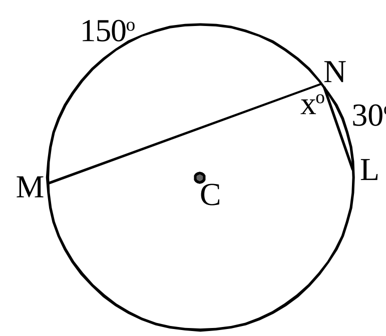


Based on figure three, we can conclude that:
Inscribed angles that intercept the same arc are __________.

Consider the following special cases.
Find each angle measure x:





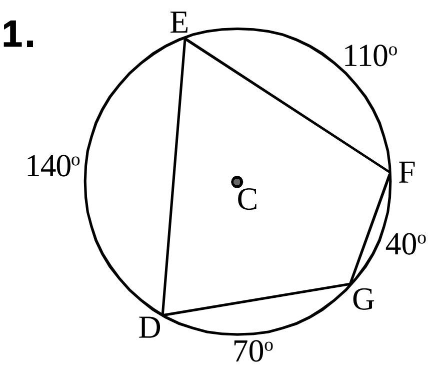


Angles inscribed in a semicircle are always ______.

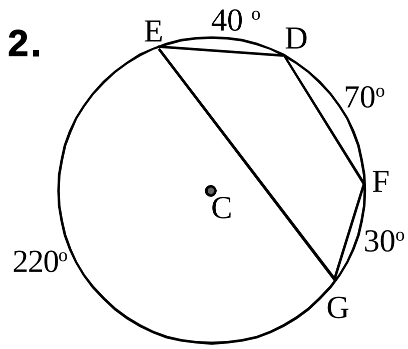
Arcs and Angles

Look at the inscribed quadrilateral below.
What relationship can you discover about the angles?

1.

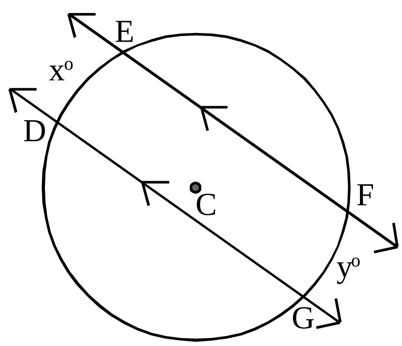


2.



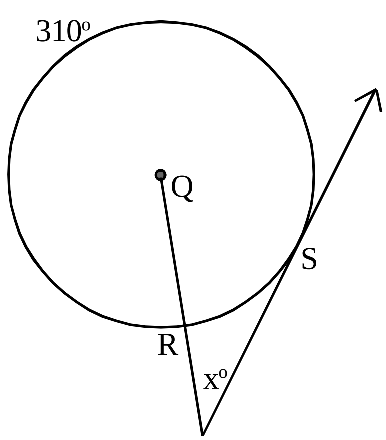
These quadrilaterals are called **cyclic quadrilaterals.**
In cyclic quadrilaterals, ________ angles are ________.

Finally, what can you conclude about the intercepted arcs in the figure below?

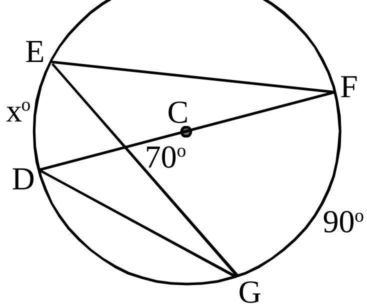


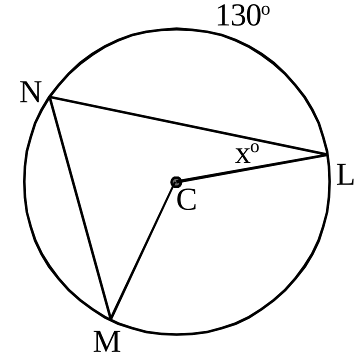
Find each angle measure x:

1.



2.





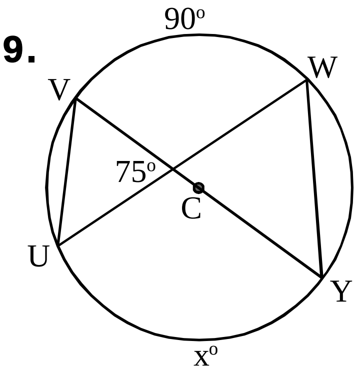
Name__________________________ Period _____

Arcs and Angles Practice

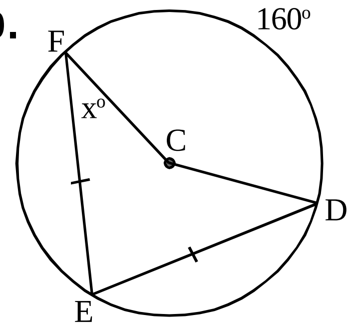
Geometry 6.3

Determine the length or measure of each x labeled below:

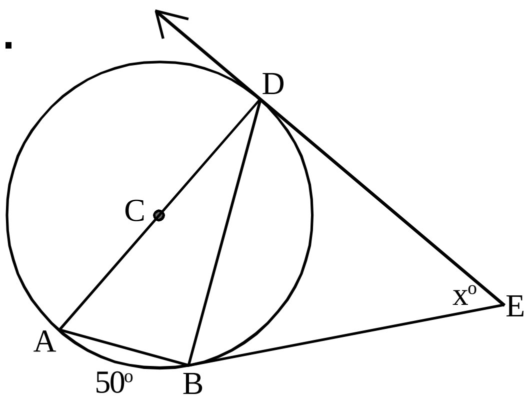
9.



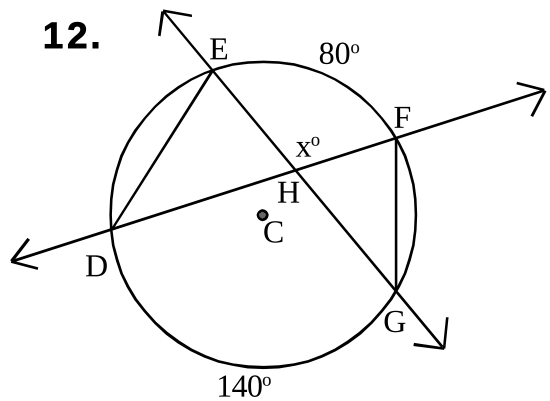
10.



11.

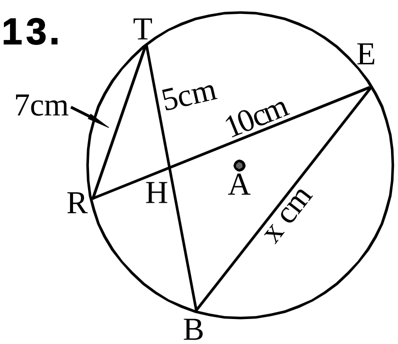


12.

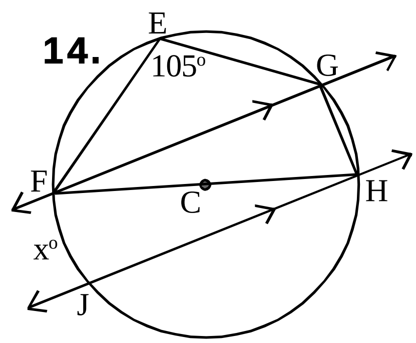


Determine the length or measure of each x labeled below:

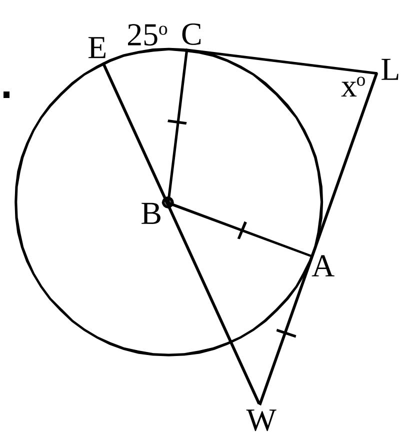
13.



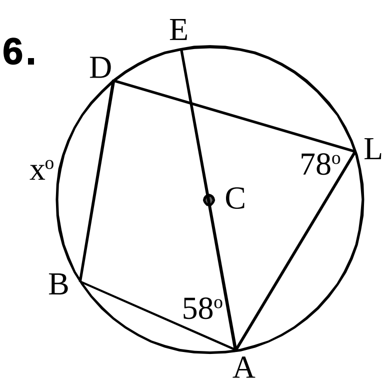
14.



15.



16.



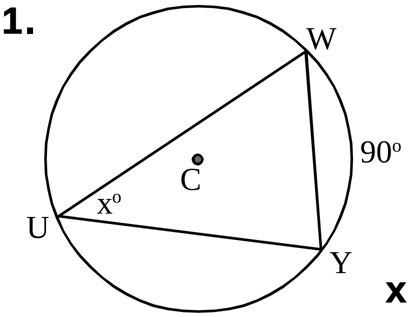
Name________________________ Period _____

Practice Quiz: Circle Properties

Geometry 6.3

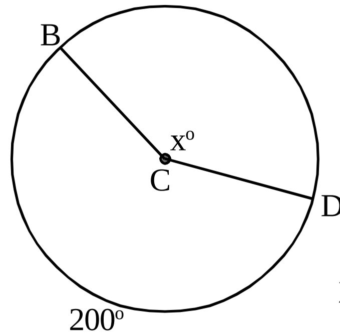
Solve for x. Drawings not necessarily to scale.

1.



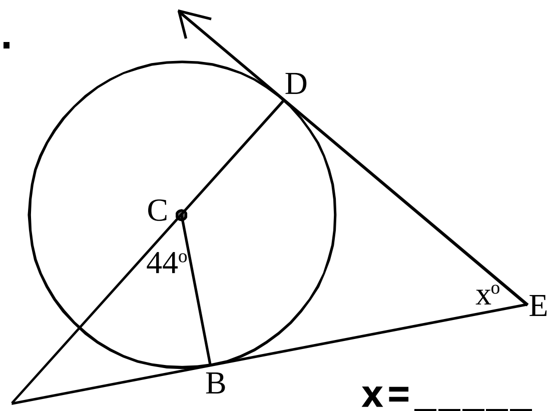
x=_____

2.



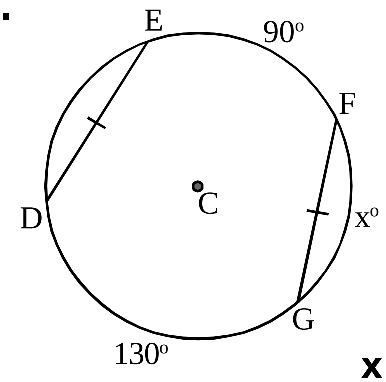
x=_____

3.



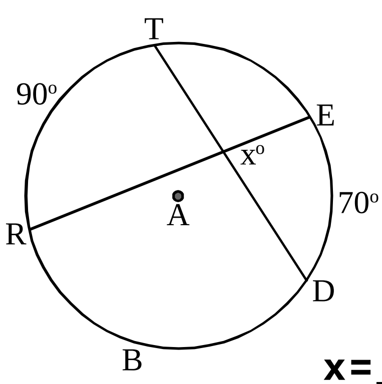
x=_____

4.



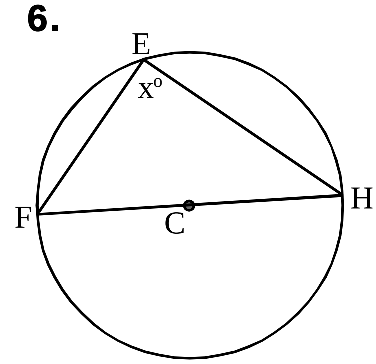
x=_____

5.



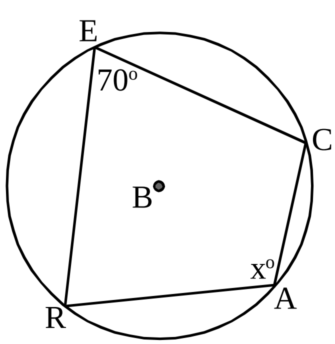
x=_____

6.



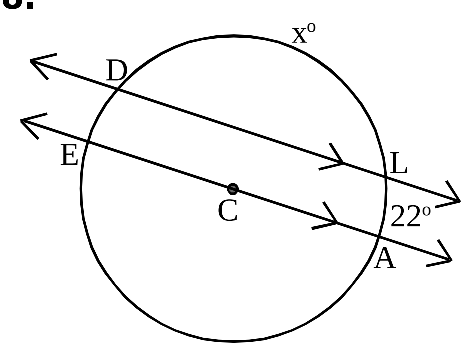
x=_____

7.



x=_____

8.



x=_____

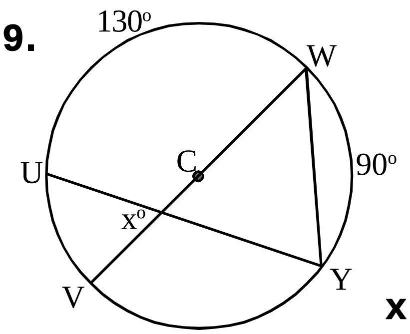
Name_________________________ Period _____

Practice Quiz: Circle Properties

Geometry 6.3

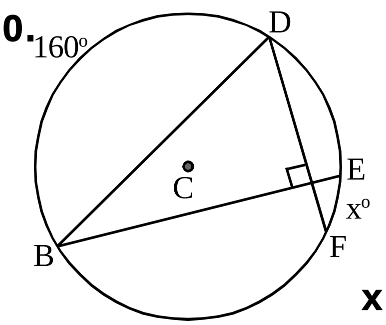
Solve for x: Drawings not necessarily to scale.

9.



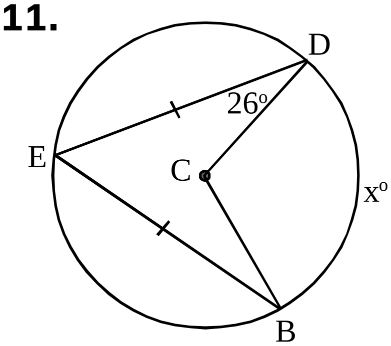
x=_____

10.



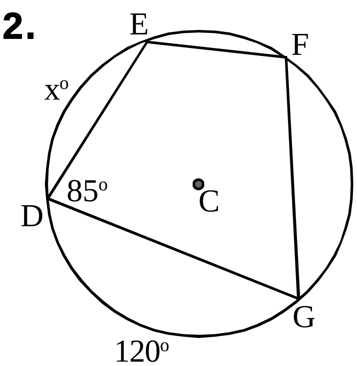
x=_____

11.



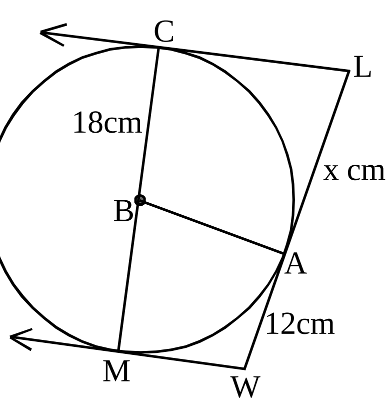
x=_____

12.



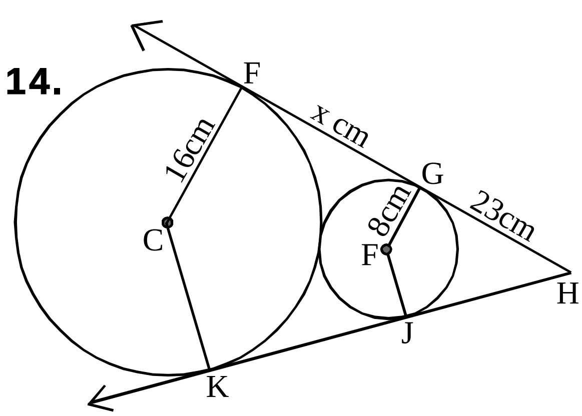
x=_____

13.



x=_____

14.



x=_____

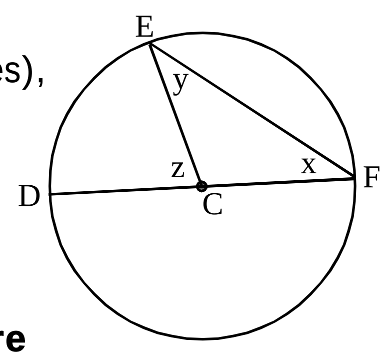
Circle Proofs

Some **Algebraic Properties** that are useful when applied to Geometric Proofs:

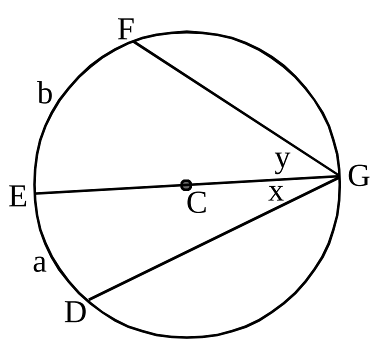
Properties of equality:
Addition, subtraction, multiplication, and division properties of equality:
Substitution:
Transitive Property:
Reflexive Property:

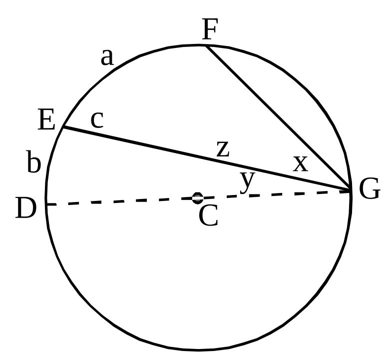
We have been using the **Inscribed Angle Conjecture:**
The measure of an angle inscribed in a circle is half the measure of the intercepted arc.

Prove it:
Use:
Central Angle Conjecture,
Exterior Angle Conjecture (for triangles),
Base angles of an isosceles triangle,
Substitution.
Show:
m$\angle$DFE = 1/2 m$\overset{\frown}{DE}$



Use the **Inscribed Angle Conjecture** to prove the two cases below:





Name/label everything (given)
Use Algebra.
Show m $\angle$GDF = 1/2 m$\overset{\frown}{DF}$

Show m $\angle$EGF = 1/2 m$\overset{\frown}{EF}$

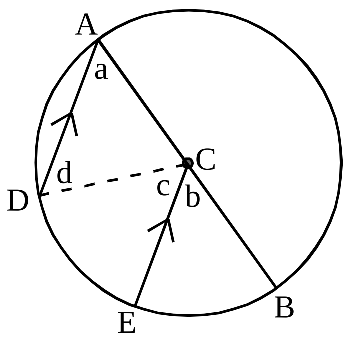
Name_________________________ Period _____

Proofs Practice

Geometry 6.4

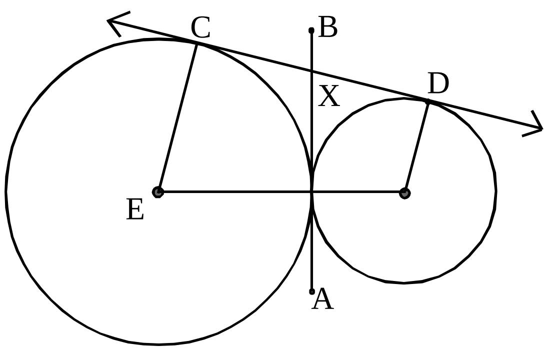
Prove each of the following using a two-column proof:

1. Prove $\overset{\frown}{DE} \cong \overset{\frown}{BE}$



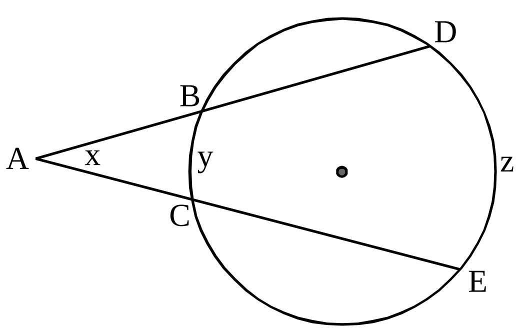
hint: This proof relies heavily on the transitive property.

2. Prove $\overline{AB}$ bisects $\overline{CD}$ at X



hint: You may use the Tangent Segments Conjecture (p. 314).

3. Prove that $x = \frac{1}{2}(z - y)$



hint: Add BE to the diagram.

Name________________________ Period _____

More Cool Circle Properties

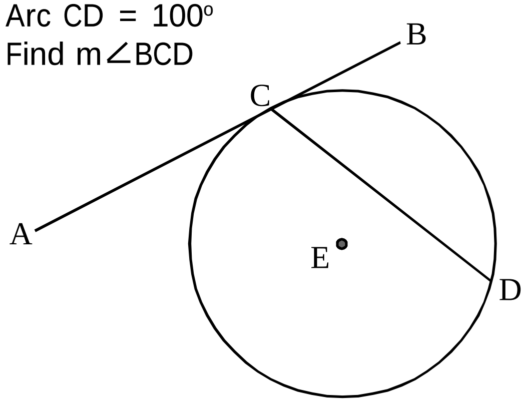
Geometry 6.4

4. Solve:

$\overline{AB}$ is tangent to circle E at C.

Arc CD = 100°

Find m∠BCD



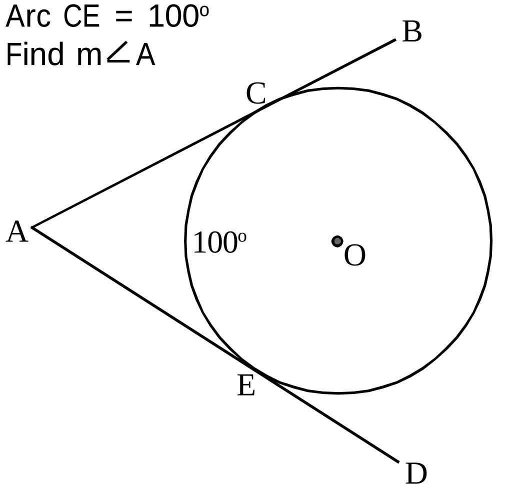
hint: Add diameter $\overline{CF}$.

5. Solve:

$\overline{AB}$ is tangent to circle O at C and AD is tangent at E.

Arc CE = 100°

Find m∠A

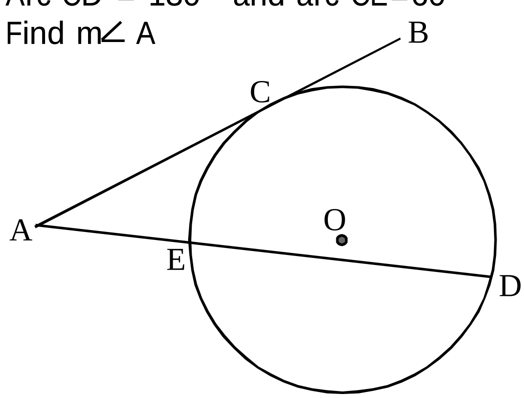


6. Solve:

$\overline{AB}$ is tangent to circle O at C.

Arc CD = 130° and arc CE=60°

Find m∠ A



hint: Add chord $\overline{CD}$. Refer to #4.

Pi

Pi is the ratio of a circle's circumference to its diameter.

3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510

Pi is computed to millions of digits using a variety of techniques like the following continued fraction:

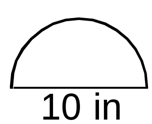
$$\pi = 3 + \cfrac{1}{6 + \cfrac{9}{6 + \cfrac{25}{6 + \cfrac{49}{6 + \cfrac{81}{6 + \cfrac{121}{\ddots}}}}}}$$

Here is another **method for computing Pi**, computed by Indian Mathematician **Srinivasa Ramanujan** (1887-1920 look him up).
This is the formula that is the basis for most computer estimations of Pi to millions of digits.   Looks easy, right?

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

Complete the following exercises involving Pi before we move on to some more difficult problems:

1. Find the radius of a circle whose circumference is 6π
2. What is the circumference of a circle whose radius is 1/2?
3. Find the circumference of a circle whose radius is 4cm in terms of pi.
4. A semicircle has a diameter of 10 inches. What is the perimeter of the entire figure?

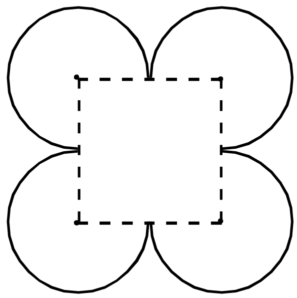


5. The radius of an automobile tire is 22 inches. The tire has a 40,000 mile warranty. How many rotations will the tire make before the warranty expires? Use the pi button on your calculator to estimate to the nearest whole number of rotations. (1 mile = 5,280 feet)

Pi

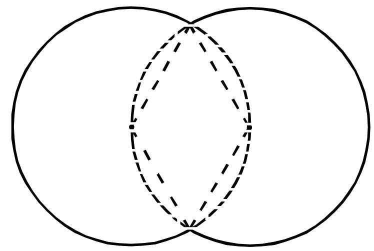
Find each perimeter in terms of Pi:

1. The perimeter of the square formed by connecting the radii is 64cm.



Find the perimeter around the outside of the figure.

2. The circles are congruent and have a 3 inch radius.



Find the perimeter around the outside of the figure.

Solve the following word problems involving Pi and speed:

1. The radius of the Earth at the equator is 3,963 miles. The earth makes one rotation every 24 hours. If you are standing on the equator, you are spinning around the Earth at a very high speed. Standing on the poles, you are only rotating. How fast are you 'moving' around the center of the Earth while standing on the equator (to the nearest mph).

2. Kimberly is jumping rope. The rope travels in a perfect circle with a diameter of 7 feet. She can skip 162 times in a minute if she really tries. How fast is the center of the jump rope traveling as she jumps rope?

3. A compact disc has a radius of approximately 2.25 inches. Your high-speed disc burner spins the CD at 8,000 RPM (revolutions per minute). What is the speed at the edge of the disc to the nearest mile per hour?

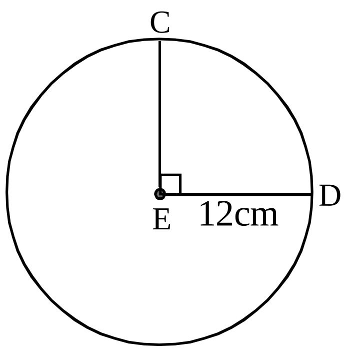
Challenge: Approximate the radius of orbit for the moon.

1. The moon takes approximately 28 days to travel around the Earth. It is traveling at a relative speed of about 2,230 mph around the earth. What is the radius of the moon's orbit (Based on the statistics given, what is the distance from the Earth to the moon to the nearest mile?).

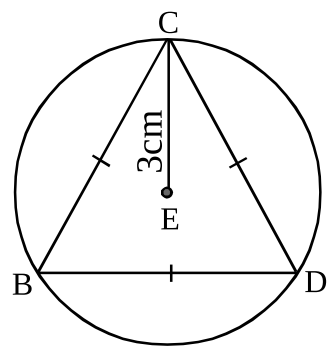
Arc Length

Determine the arc length for each figure below in terms of pi:

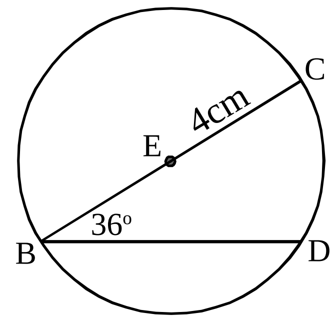
$\overset{\frown}{CD}$ = ______



$\overset{\frown}{CD}$ = ______

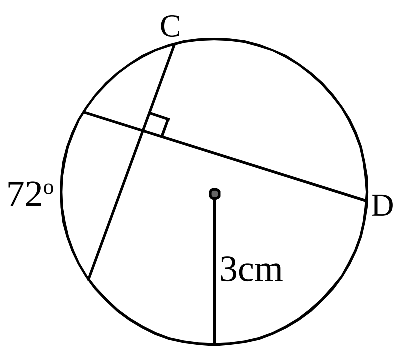


$\overset{\frown}{CD}$ = ______

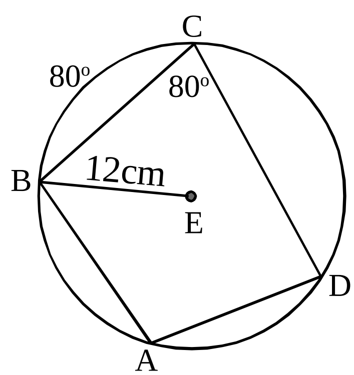


Arc length can be found using a fraction of the circumference.
Determine the arc length for each figure below in terms of pi:

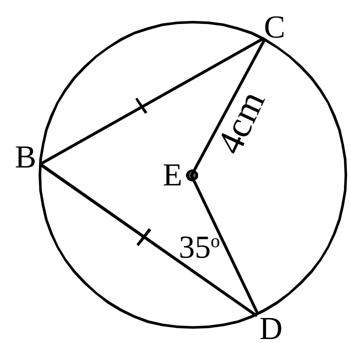
$\overset{\frown}{CD}$ = ______



$\overset{\frown}{CD}$ = ______

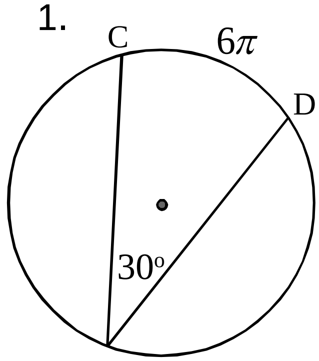


$\overset{\frown}{CD}$ = ______

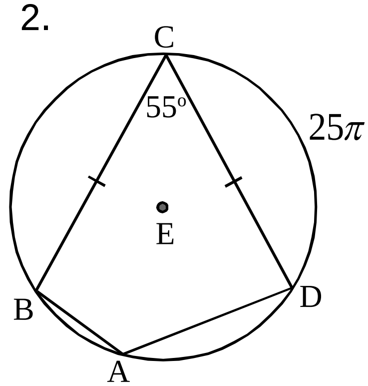


Work in reverse:
Find each radius.

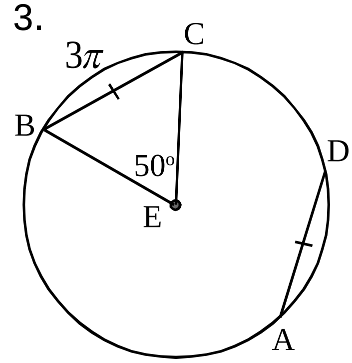
1.



2.



3.



Review

What have we learned?

<u>Conjectures:</u> (Theorems)

Chords Arcs Conjecture: Congruent Chords define Congruent Arcs.

Chord Perpendicular Bisectors: The perpendicular bisector of a chord passes through the center of the circle.

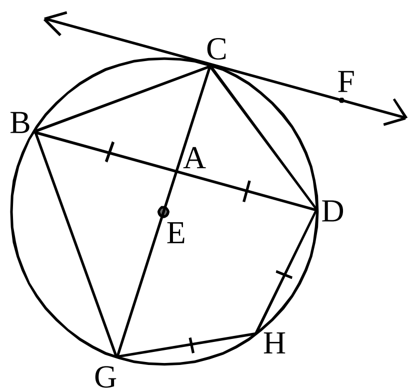
Tangent Conjecture: Tangents are Perpendicular to Radii.

Tangent Segments Conjecture: Intersecting tangent lines are congruent.

Inscribed Angle Conjecture: Inscribed angles are half the measure of intercepted arcs.

Cyclic Quadrilaterals Conjecture: Opposite angles are supplementary.

Parallel Lines Conjecture: Intercepted arcs of parallel lines are congruent.



Can you prove $CF \parallel BD$?

Can you prove $\overset{\frown}{BD} \cong \overset{\frown}{BG}$?

Can you prove $\overset{\frown}{BC} \cong \overset{\frown}{CD}$?

How do you know ∠BGH and ∠HDB are supplementary?

How do you know ∠ACF is a right angle?

Can you prove that ∠CAD is a right angle?

∠FCD = 32°. Find the measures of all minor arcs in the figure.
What is the measure of ∠H?

$\overset{\frown}{BC} = 16\pi$ inches. What is the radius of circle E?

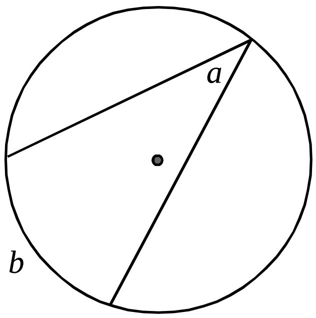
Name_________________________ Period _____

Review

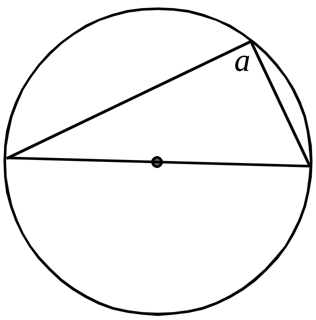
Geometry

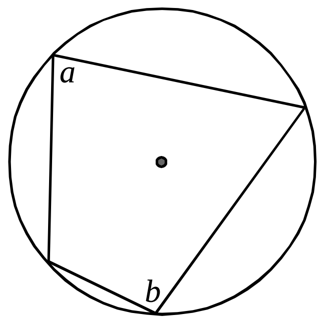
Write a relationship demonstrated by each diagram.

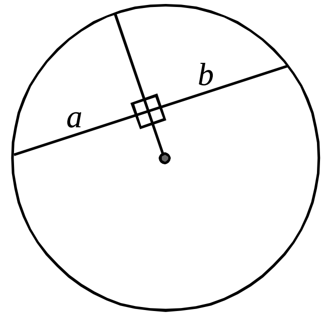
Example:

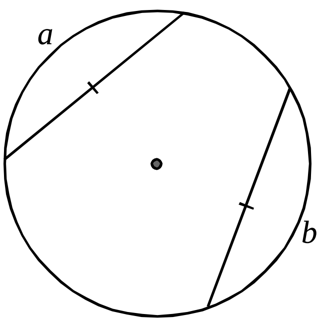


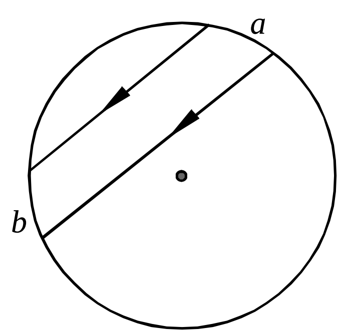
$$a = \frac{1}{2}b$$

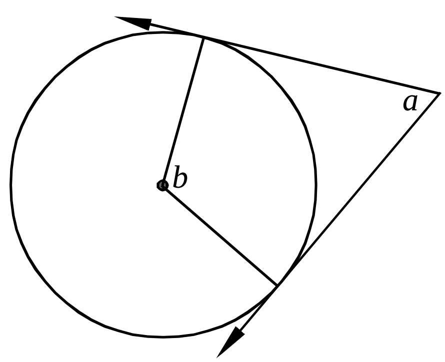


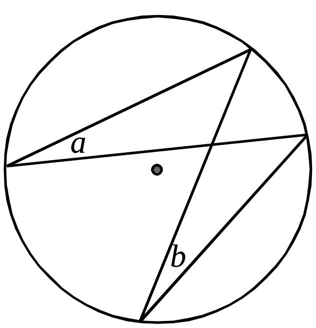


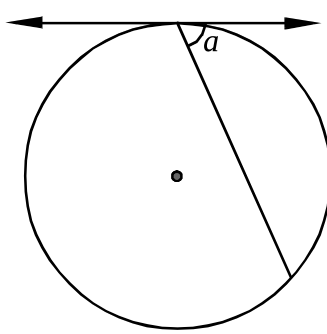


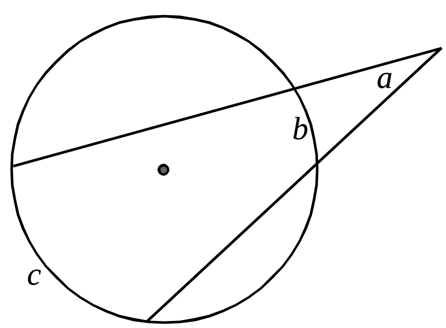










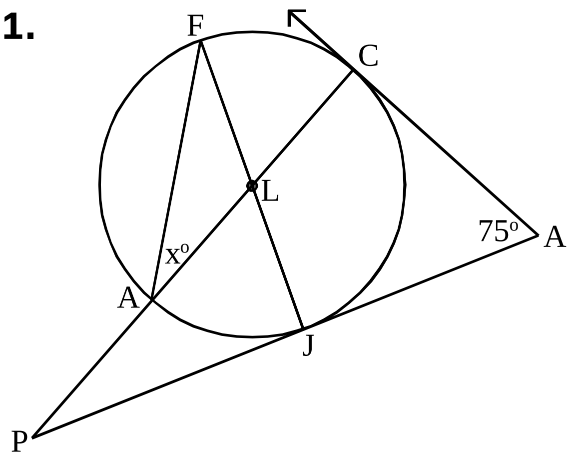


Review

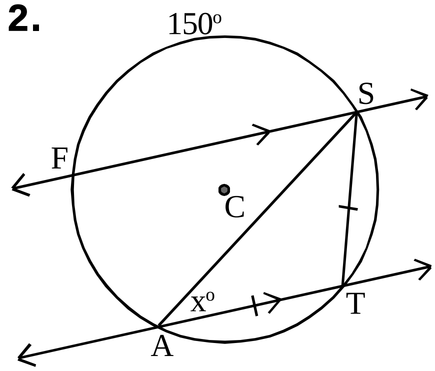
Geometry 6.7

Find the missing angle measure x for each figure below.

1.

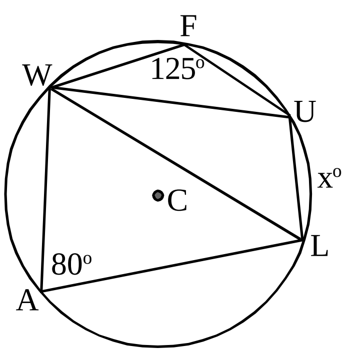


2.

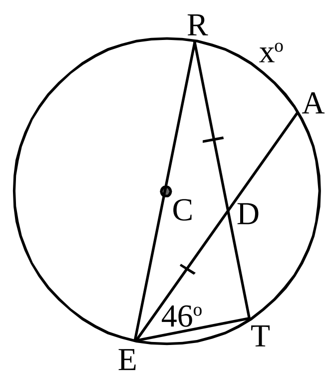


Find the missing arc measure x for each figure below.

1.

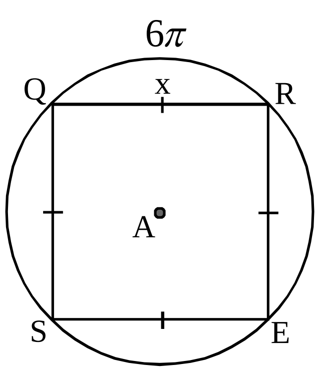


2.



Find the missing length x for each figure below.

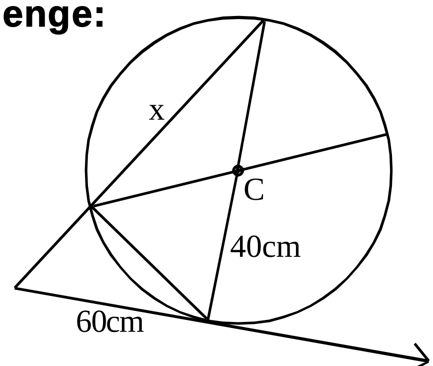
1.



hint: $a^2+b^2=c^2$

leave answer in radical form

Challenge:

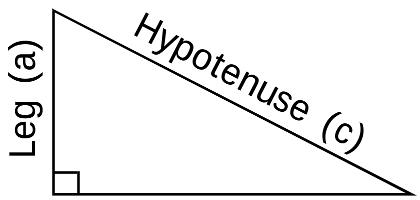


hint: $a^2+b^2=c^2$

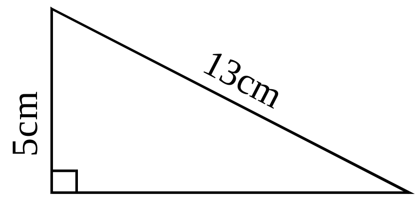
Pythagorean Introduction

The Pythagorean Theorem is useful in solving all sorts of problems. Because right angles appear so often in circles, it is necessary to give a brief introduction to the Pythagorean Theorem before moving farther.

Pythagorean Theorem:
The sum of the squares of the legs of a right triangle is equal to the square of the hypotenuse, or more familiar to most: $a^2 + b^2 = c^2$

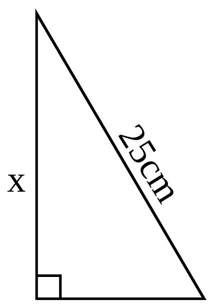


Ex.

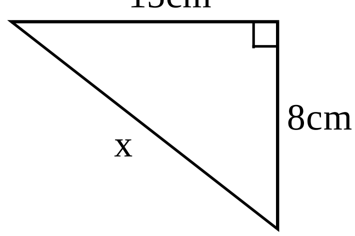


Practice: Solve for x in each.
Leave answers in radical form where applicable.

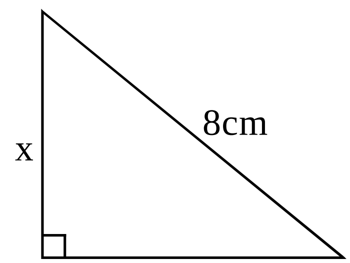
1.



2.



3.

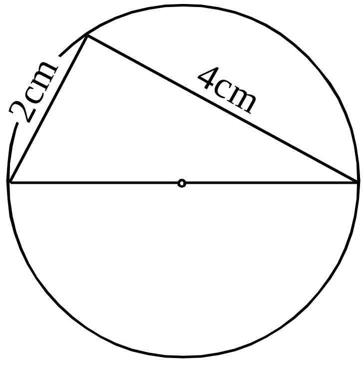


Remember how to simplify Square Roots:

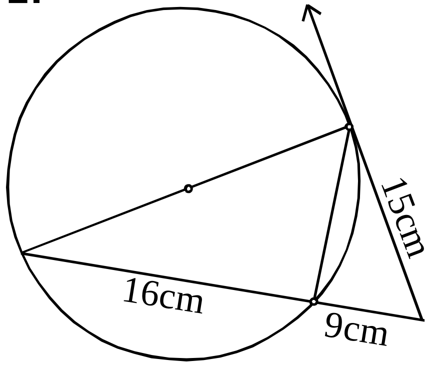
1. $\sqrt{12}$ **2.** $\sqrt{72}$ **3.** $\dfrac{5}{\sqrt{2}}$

Now, find the area of each circle in terms of Pi:

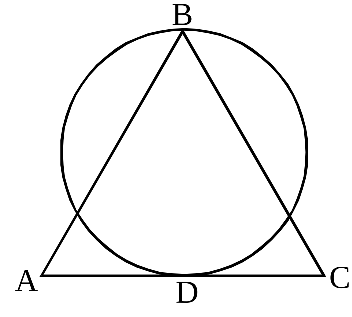
1.



2.



3. $\triangle$ABC is equilateral. with AC=8cm



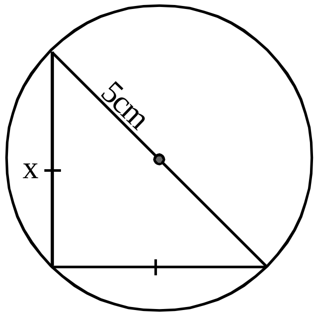
Name_________________________ Period _____

Pythagoras and the Circle

Geometry 6.7

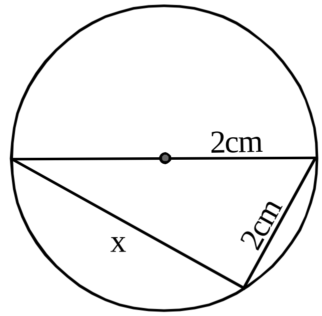
Solve for x in each of the following diagrams:

1.



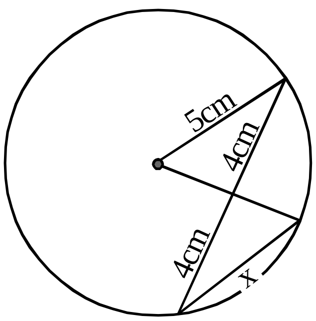
x _________

2.



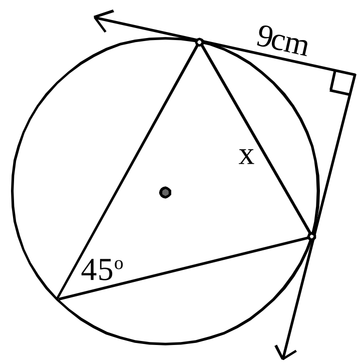
x _________

3.



x _________

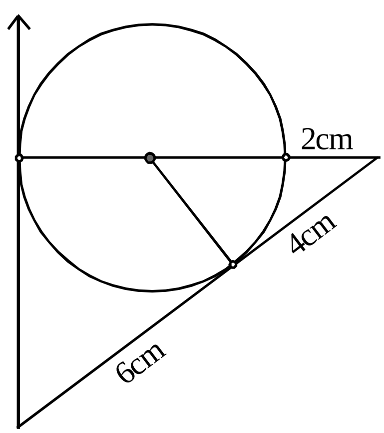
4.



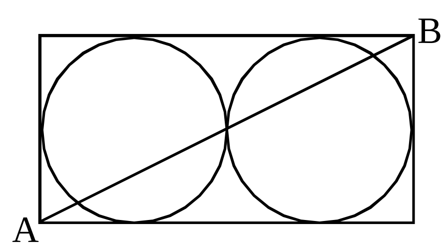
x _________

Find the area of each circle below: Circle Area = πr^2

5.



6.



AB=10cm

Circle Area ________π cm^2

Circle Area (each) ________π cm^2

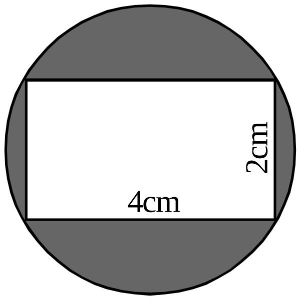
Name________________________ Period _____

Pythagoras and the Circle

Geometry 6.7

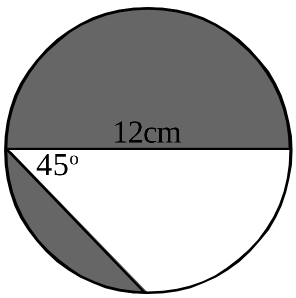
Find the shaded area in each diagram below:
Answers should be expressed in terms of Pi and in simplest radical form where appllcable.

7.



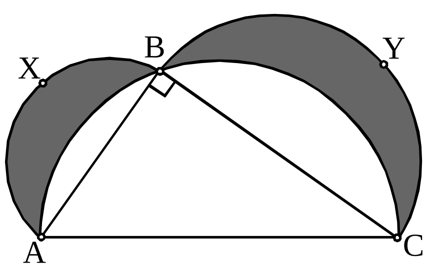
Area ____________ cm^2

8.



Area ____________ cm^2

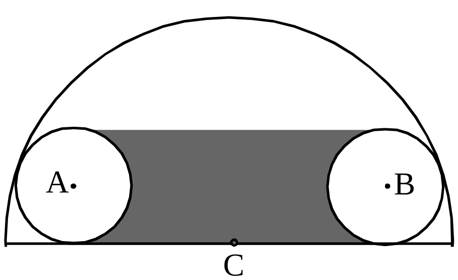
9.



The shaded areas are called 'lunes'. ABC, AXB, and BYC are all semicircles. AB = 16, BC=30. Find the combined area of the shaded lunes.

Area ____________ cm^2

10.



Small circles of radius 5 are placed inside a semicircle of radius 18 so that the smaller circles are tangent to the large semicircle. Find the shaded area.

For hint: Read this upside-down in a mirror. hint: find length ac

Area ____________ cm^2

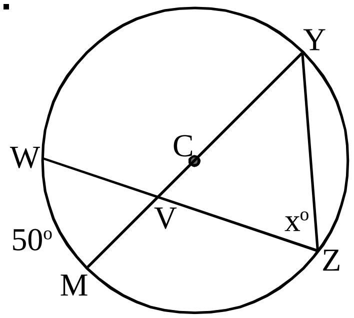
Name________________________ Period _____

Circle Properties Practice Test

Geometry 6.7

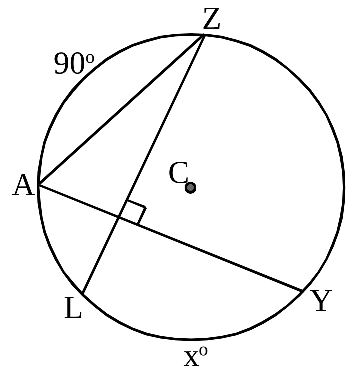
Solve for x in each of the following diagrams:

1.



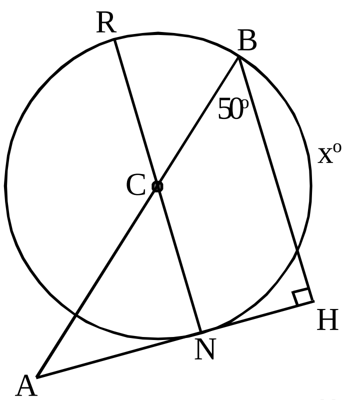
x ________

2.



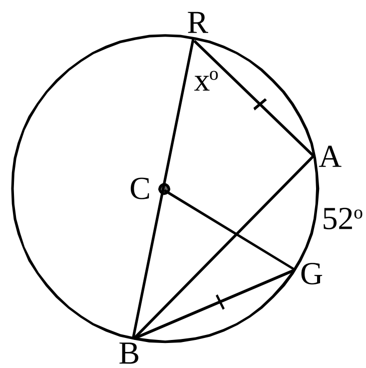
x ________

3.



x ________

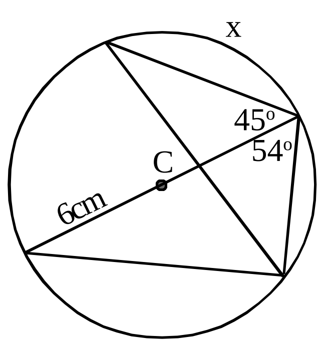
4.



x ________

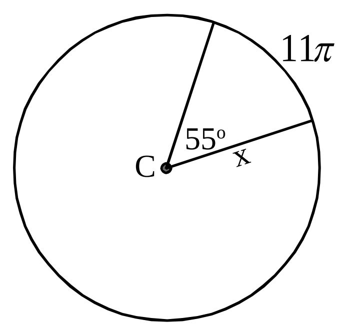
Find the missing length for each figure below (in terms of pi where applicable):

5.



x ________

6.



x ________

7. The tire of a car traveling 30 mph makes 500 rotations per minute.
What is the radius of the tire? note: 1 mile = 5,280 feet.
Round to the nearest inch.

7. _______

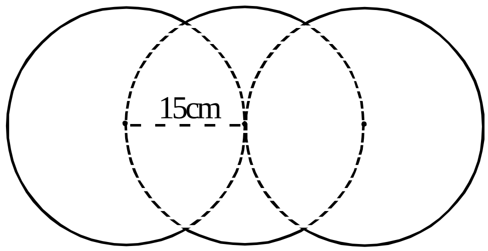
Name________________________ Period _____

Circle Properties Practice Test

Geometry 6.7

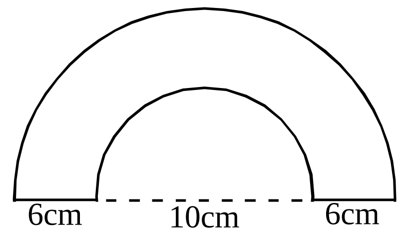
Find the perimeter of each figure:

8.



perimeter of the figure: _________

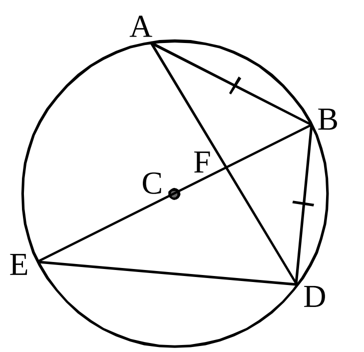
9.



perimeter of the figure: _________

10. Prove:

In the figure below, prove that ∠ADB ≅ ∠BED.



You may use the conjecture names or brief descriptions to justify each step.
Remember to list given information.

______________________________ ______________________________

______________________________ ______________________________

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______________________________ ______________________________

______________________________ ______________________________

______________________________ ______________________________

______________________________ ______________________________

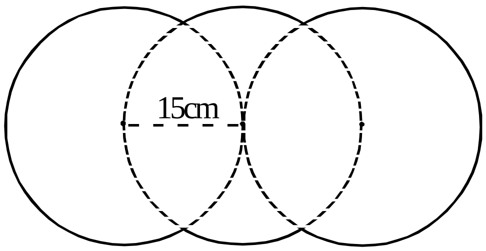
Name_________________________ Period _____

Circle Properties Practice Test

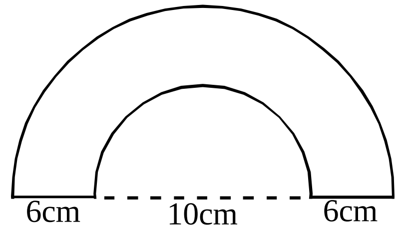
Geometry 6.7

Find the perimeter of each figure:

8.



9.

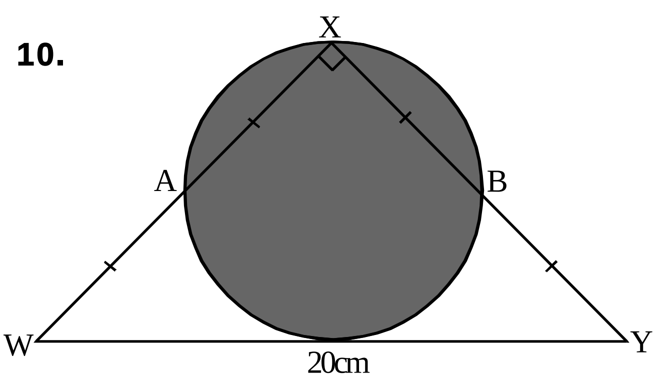


perimeter of the figure: _________

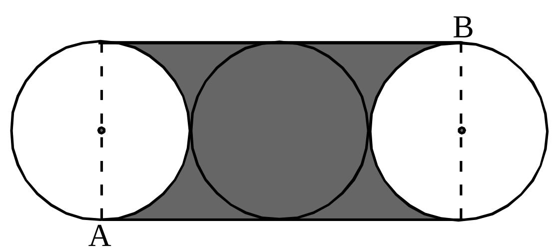
perimeter of the figure: _________

Find the area of each shaded region (in terms of pi where applicable):

10.



11. AB = $2\sqrt{5}$



(this one is a little harder than the real test question, but you should be able to do it)

total shaded area: _________

total shaded area: ________

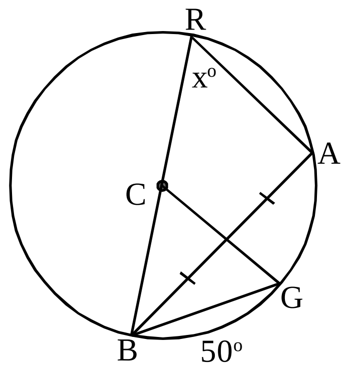
Name_________________________ Period _____

Review Problem Set

Geometry 6.7

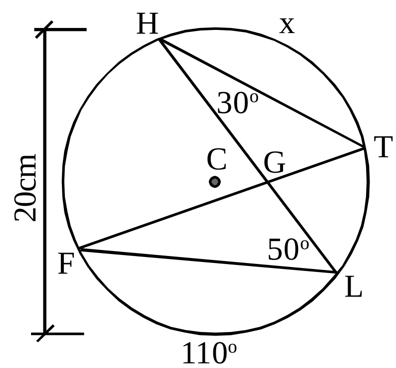
1.
Find the missing angle measure x:

_____



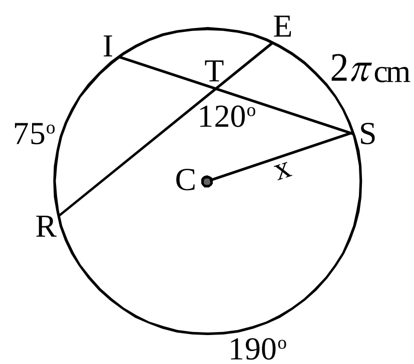
2.
Find the missing length x in terms of pi:

_____



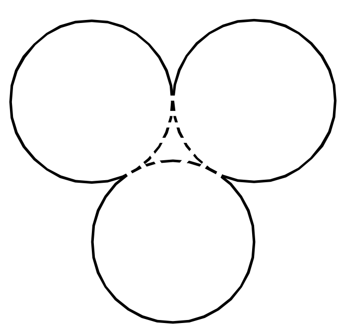
3.
Find the missing radius:

_____



4.
Find the perimeter if the congruent circles have radii of 5cm:

_____



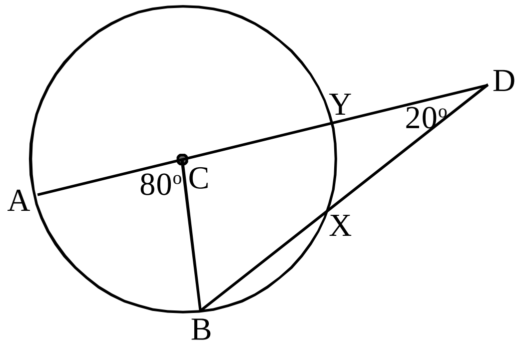
Name________________________ Period _____

Challenge Problem Set

Geometry 6.7

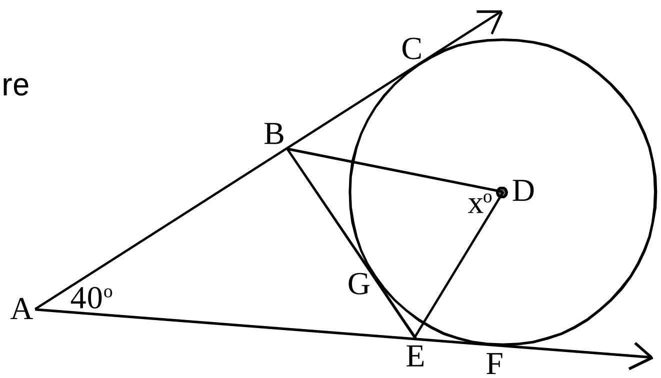
5.
Find the measure of arc XB.

_____



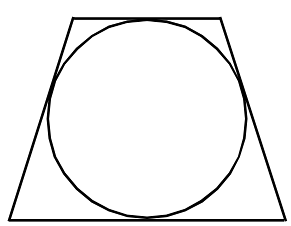
6.
Find the measure of angle BDE.

_____



7.
Segment AB is tangent to circle C at point B. If AB = 8cm and the circle radius is 6cm, what is the shortest possible distance AX where X is a point on the circle?

8.
What is the area of the circle inscribed within an isosceles trapezoid whose bases are 9cm and 16cm long? Express your answer in terms of pi.



[illegible] prob
hint:draw a radius to each point
of tangency [illegible]

Name________________________ Period _____

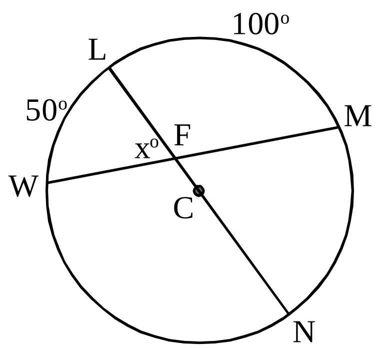
Circle Properties

Geometry 6.7

Practice

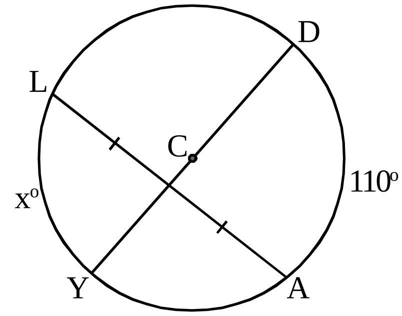
Solve for x in each:

1.



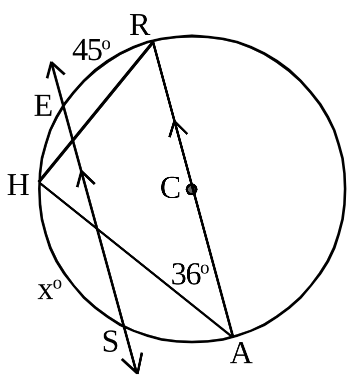
x = ________

2.



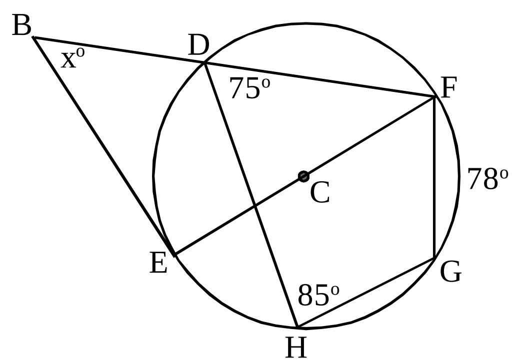
x ________

3.



x ________

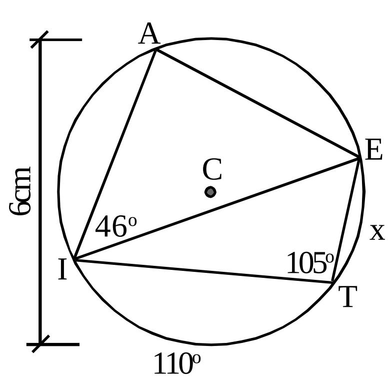
4.



x ________

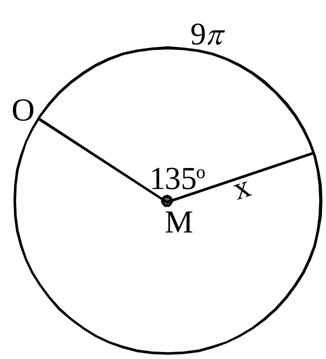
Find the missing length for each figure below (in terms of pi where applicable):

5.



x ________

6.



x ________

Name________________________ Period _____

Circle Properties

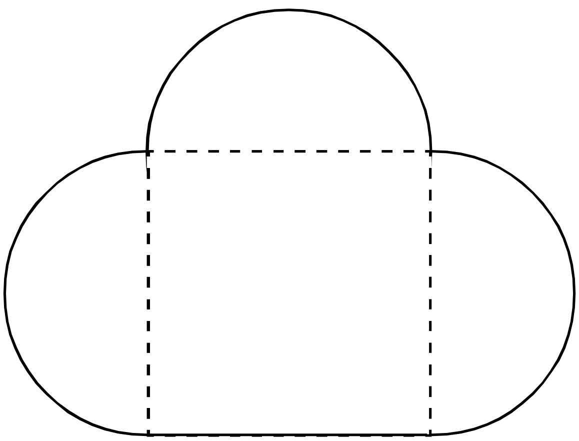
Practice:
Solve each.

7. The track coach at UNC wants an indoor track that is banked and a perfect circle, sized so that if a runner can finish one lap in one minute, he will be traveling at 15mph. What should the radius of the track be? (to the nearest foot, 5280ft = 1mile.)

7. _______

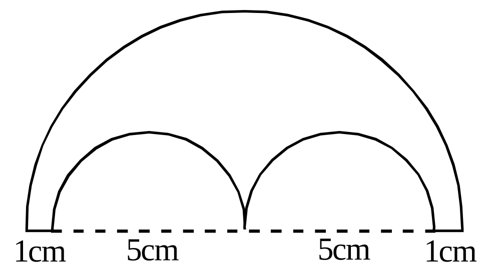
Find the perimeter of each:

8. The perimeter of the interior square is 11 inches.



perimeter of the figure: ________
(to the nearest tenth)

9.



perimeter of the figure: ________
(in terms of pi)

Name________________________ Period _____

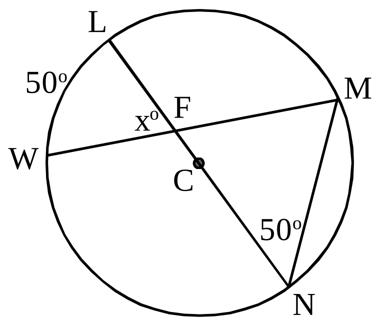
Circle Properties Retake Work

Geometry 6.7

Practice

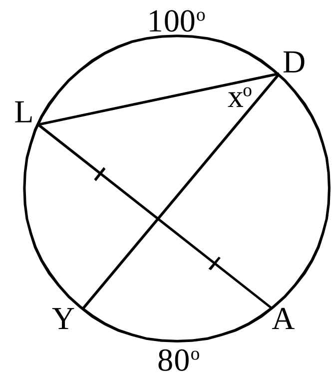
Solve for x in each:

1.



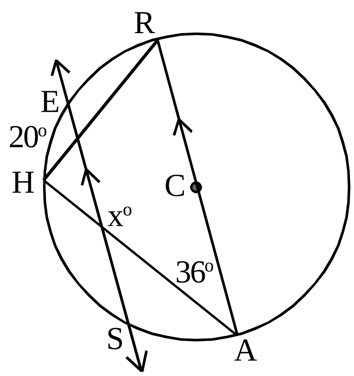
x = ________

2.



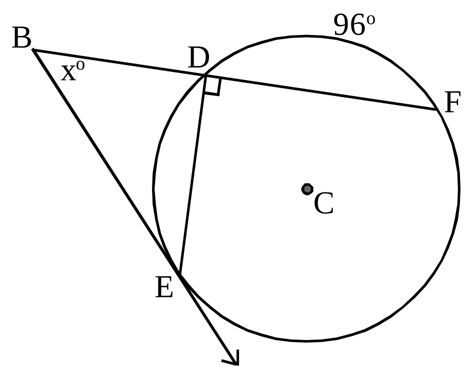
x ________

3.



x ________

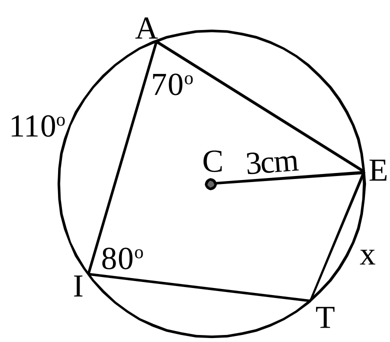
4.



x ________

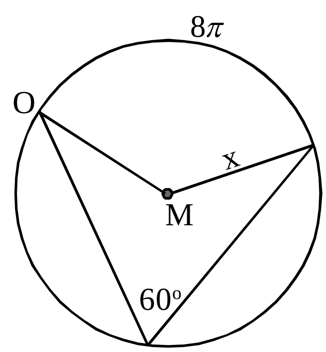
Find the missing length for each figure below (in terms of pi where applicable):

5.



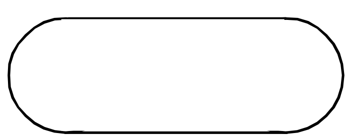
x ________

6.



x ________

7. A racetrack has two semi-circular turns, each with a radius of 1000ft, and two straight-aways, each 2000 feet long. To the nearest second, how long will a car traveling 120 miles per hour take to complete one lap on the track?



7. _______

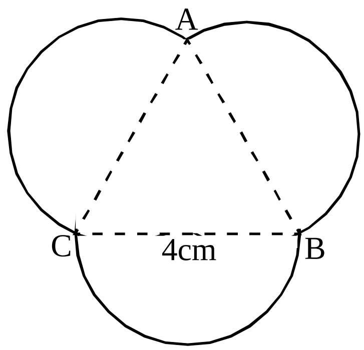
Name_________________________ Period _____

Circle Properties Retake Work

Geometry 6.7

Find the perimeter of each figure (outside the figure only):

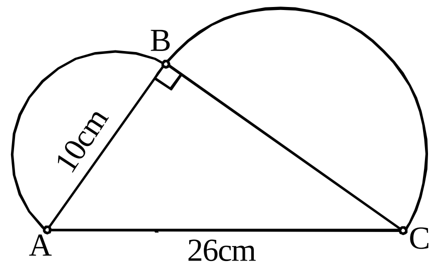
8.



(Triangle ABC is equilateral.)

perimeter of the figure: _________
(to the nearest tenth)

9.

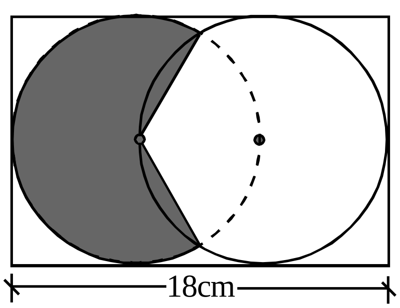


(Hexagon ABCDEF is regular.)

perimeter of the figure: _________
(in terms of pi)

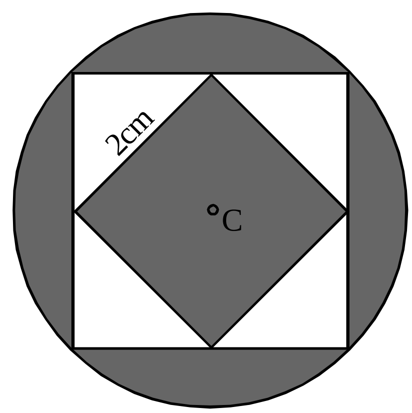
Find the area of each shaded region (in terms of pi where applicable):

10.



total shaded area: _________

11.



The vertices of the smaller square are the midpoints of the larger square, which is inscribed in circle C.

total shaded area: ________