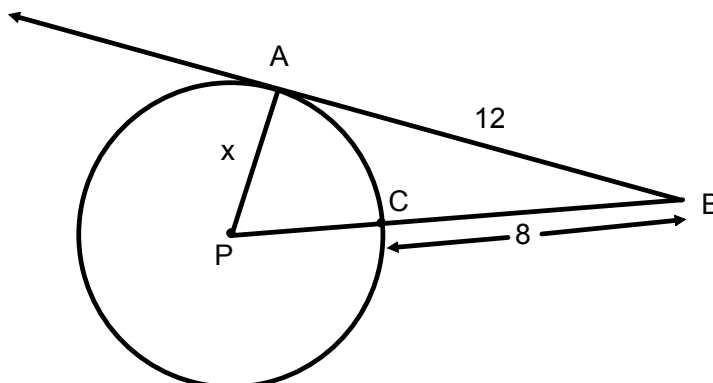


Warm-Up

Solve for x .



Everyone grab a compass, protractor, and 2 pieces of patty paper.



Chord Properties Day 1

Learning Targets

- I can identify and apply the Perpendicular to a Chord Conjecture.
- I can identify and apply the Chord Distance to Center Conjecture.
- I can identify and apply the Perpendicular Bisector of a Chord Conjecture.

Please pick up: A handout, a piece of patty paper, a compass, and protractor

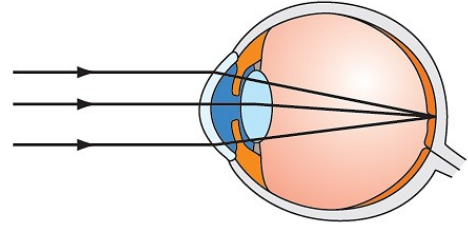
LESSON

9.2

Chord Properties

In the last lesson you discovered some properties of a tangent, a line that intersects the circle only once. In this lesson you will investigate properties of a chord, a line segment whose endpoints lie on the circle.

In a person with correct vision, light rays from distant objects are focused to a point on the retina. If the eye represents a circle, then the path of the light from the lens to the retina represents a chord. The angle formed by two of these chords to the same point on the retina represents an inscribed angle. How would you define an inscribed angle?

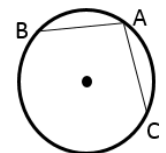


Before investigating the properties of chords in a circle, let's define two types of angles in a circle.

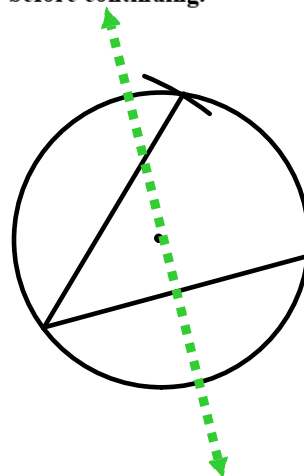
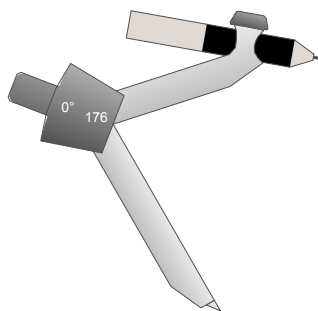
Complete Task 1 Steps 1 - 5

TASK 1: CHORDS OF A CIRCLE

- Using your compass, carefully construct a large circle on your patty paper.
- Darken the center of your circle. Label it with Point P.
- Draw a point *on* your circle and label it with Point A.
- Construct chord \overline{AB} .** Construct chord \overline{AB} such that it does not intersect the center Point P.
- Construct a chord that is congruent to chord \overline{AB} .** Use your compass to record the distance between points A and B. Using this distance, with the compass point on Point A, draw an arc that intersects the other side of the circle. Label that point of intersection with Point C. Construct \overline{AC} using your protractor.



STOP and compare your circle with others' before continuing.



Complete steps 6 - 7 then answer questions A - D

6. Fold your patty paper so that the endpoints A and B touch.
7. Using your protractor as a straight edge, draw a segment along the crease with the endpoints on the circle. Label the endpoints with Point E and Point F. Label the point where this segment intersects chord \overline{AB} with Point G.

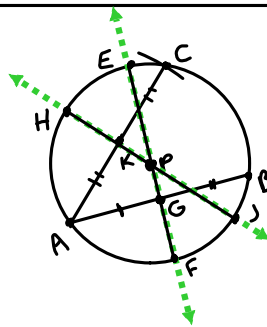
QUESTIONS:

A. Is there something unique about the segment you drew in step #7 with regards to Circle P? Explain.

B. What observation(s) can you make about \overline{AG} and \overline{BG} ?

C. There were four angles formed at Point G where the chords intersect. What is true about them?

D. We can say that chord is a _____ of chord \overline{AB} .



8. Fold your patty paper so that the endpoints A and C touch.
9. Using your protractor as a straight edge, draw a segment along the crease with the endpoints on the circle. Label the endpoints with Point H and Point J. Label the point where this segment intersects chord AC with Point K.
10. Would your answers to Questions A – D above follow suit for this particular chord AC? _____

Perpendicular Bisector of a Chord Conjecture

The _____ of any chord passes through the _____ of the circle.

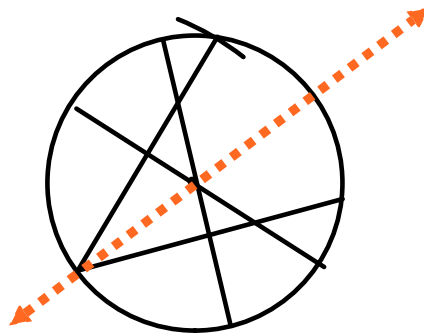
Perpendicular to a Chord Conjecture

The perpendicular from the _____ of a circle to a chord is the _____ of the chord.

TASK 2: COMPARING DISTANCES

Recall that $\overline{AB} \cong \overline{AC}$. Using the same patty paper from Task 1, carefully fold it such that \overline{PG} and \overline{PK} meet. What is true about \overline{PG} and \overline{PK} ? _____

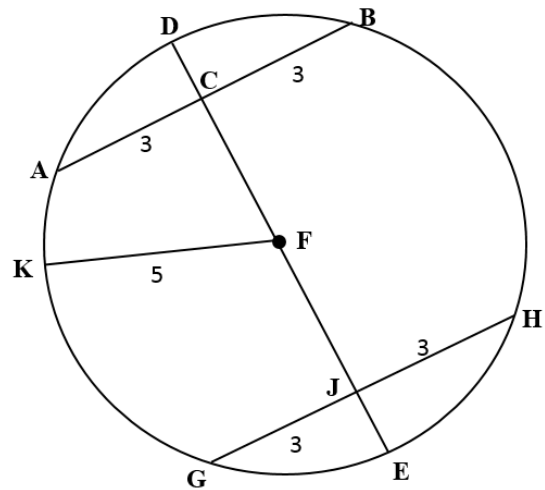
Chord Distance to Center Conjecture
 Two _____ chords in a circle are _____ from the center of the circle.



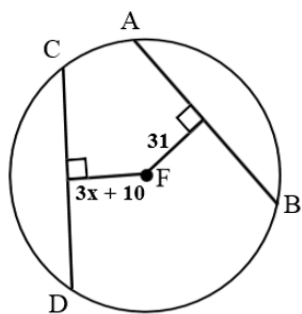
Use the figure to the right the answer #1-5:

1. Name the diameter _____
2. Name four right angles

3. $\overline{AB} \cong$ _____
4. $\overline{FC} \cong$ _____
5. Find the length of \overline{FC}

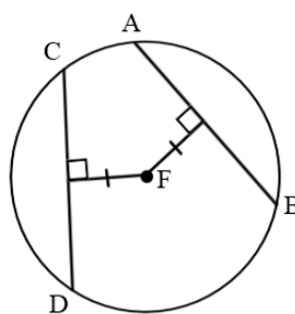


6. Given $\overline{AB} \cong \overline{CD}$, find x.



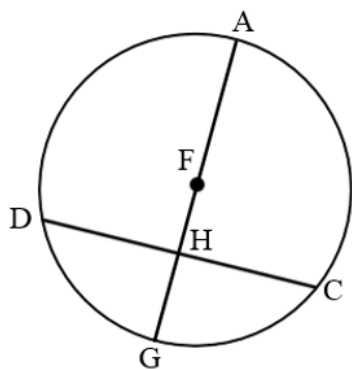
x = _____

7. Given $AB = 12x - 18$ and $CD = 10x$, find x.



x = _____

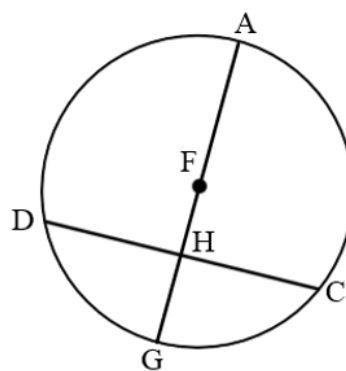
8. Given \overline{AG} bisects \overline{DC} ; $FH = 6$; and $DC = 16$, find FG and AG .



$FG =$ _____

$AG =$ _____

9. Given $\overline{AG} \perp \overline{DC}$; $AG = 26$; and $DC = 24$, find FH .



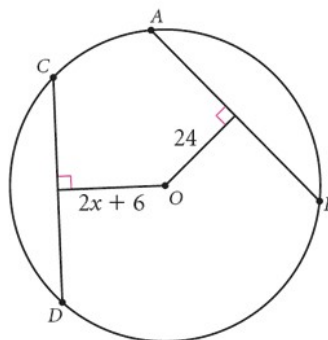
$FH =$ _____

Assignment:

9.2 Chord Properties Day 1 Homework

Warm-Up

Given Circle O with $AB \cong CD$.
Find x .





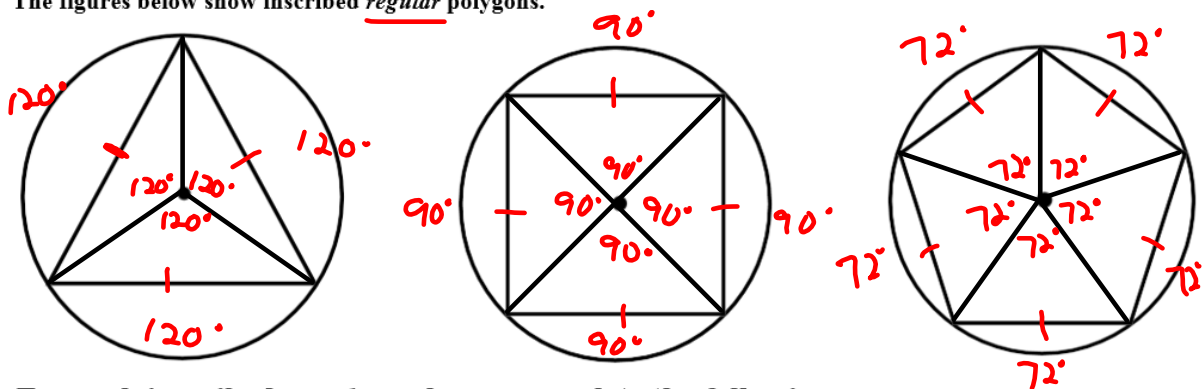
Chord Properties

Day 2

Learning Target

I can determine and apply the relationship between congruent chords and their central angles and intercepted arcs.

The figures below show inscribed regular polygons.



For each inscribed *regular* polygon, complete the following:

The polygon sides are Congruent. Add markings on your figures to reflect this.

The sides of the polygons are also called chords of the circle.

- Draw radii from the center of the circle to each vertex.
- Label the central angles with their measurements in degrees.
- Label the intercepted arcs with their measurements in degrees.

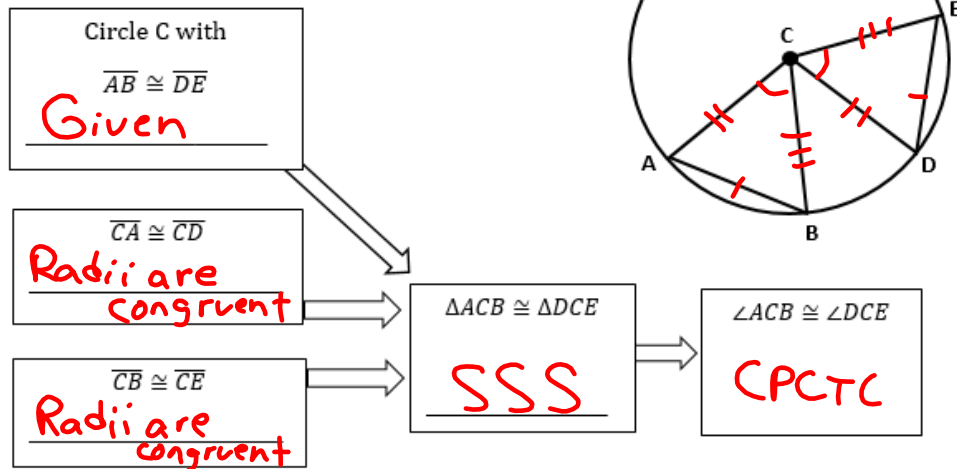
What do you notice about your drawings?

Developing a Proof

We have seen that the measurements of minor arcs are equal to their central angle measurements.

Given: Circle C with $\overline{AB} \cong \overline{DE}$

Prove: $\angle ACB \cong \angle DCE$



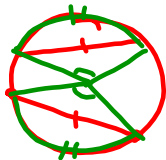
Fill in the blanks.

Chord Central Angles Conjecture

If two chords of a circle are Congruent then they determine two central angles which are congruent.

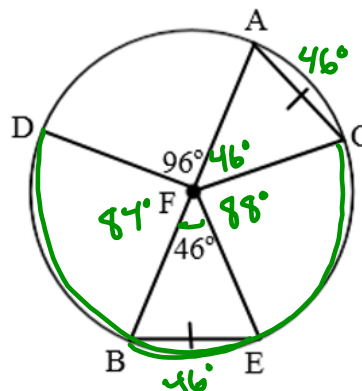
Chord Arcs Conjecture

If two chords of a circle are Congruent, then their intercepted arcs are congruent.



Use Circle F to answer questions #1 - #6. Assume \overline{AB} is a diameter.

1. $m\widehat{BE} = \underline{46^\circ}$
2. $m\widehat{AC} = \underline{46^\circ}$
3. $m\angle CFE = \underline{88^\circ}$
4. $m\angle DFB = \underline{84^\circ}$
5. $m\widehat{DEC} = \underline{218^\circ}$
6. $m\widehat{DAE} = \underline{230^\circ}$



For problems #7- #10, use the figure to find the missing information.

7.

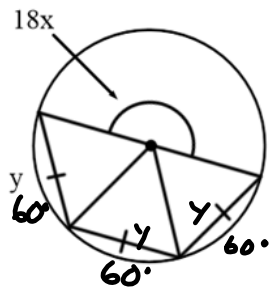
$x = \underline{20}$
 $m\widehat{TVU} = \underline{220^\circ}$
 $m\widehat{TUV} = \underline{280^\circ}$
 $7x + 7x + 4x = 360$
 $18x = 360$
 $x = 20$

8.

$x = \underline{15}$
 $m\widehat{ZU} = \underline{140^\circ}$
 $m\widehat{TUY} = \underline{230^\circ}$
 $40 = 2x + 10$
 $30 = 2x$
 $15 = x$
 $90 + 40 + 100$

For problems #7- #10, use the figure to find the missing information.

9.



$$x = \frac{10}{}$$

$$y = \underline{60^\circ}$$

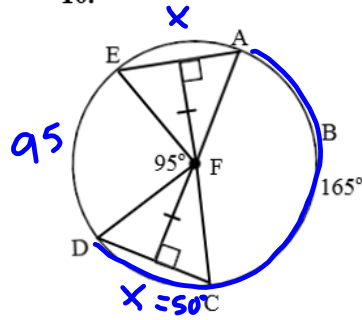
$$18x = 180$$

$$x = 10$$

$$3y = 180$$

$$y = 60$$

10.



$$165 + 95 = 260$$

$$360 - 260 = 100$$

$$100 \div 2 = 50$$

$$\widehat{EA} \cong \widehat{DC}$$

$$m\widehat{DC} = \underline{215^\circ}$$

$$2x + 95 + 165 = 360$$

$$2x = 100$$

$$x = 50$$

Assignment:

9.2 Chord Properties Day 2 Homework