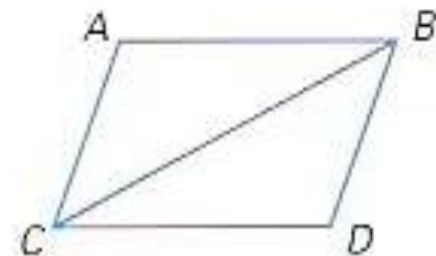


Warm up

For Exercises 1–6, use the parallelogram shown at right.
Find the indicated measures.



1. Given $m\angle A = (3x)^\circ$ and $m\angle D = (x + 100)^\circ$, find $m\angle D$.
2. Given $AB = t$ and $CD = (9 - 2t)$, find CD .
3. Given $m\angle CDB = 40^\circ$, find $m\angle A$.
4. Given $m\angle B = 50^\circ$, $m\angle C = (2x)^\circ$, and $BD = (x - 4)$, find BD .
5. Given $m\angle ABC = 15^\circ$ and $m\angle ACD = 45^\circ$, find $m\angle CBD$.
6. Given $m\angle C = 80^\circ$ and $m\angle D = x^\circ$, find $m\angle A$.

♥ This will be graded in 10 minutes.

1. 150°

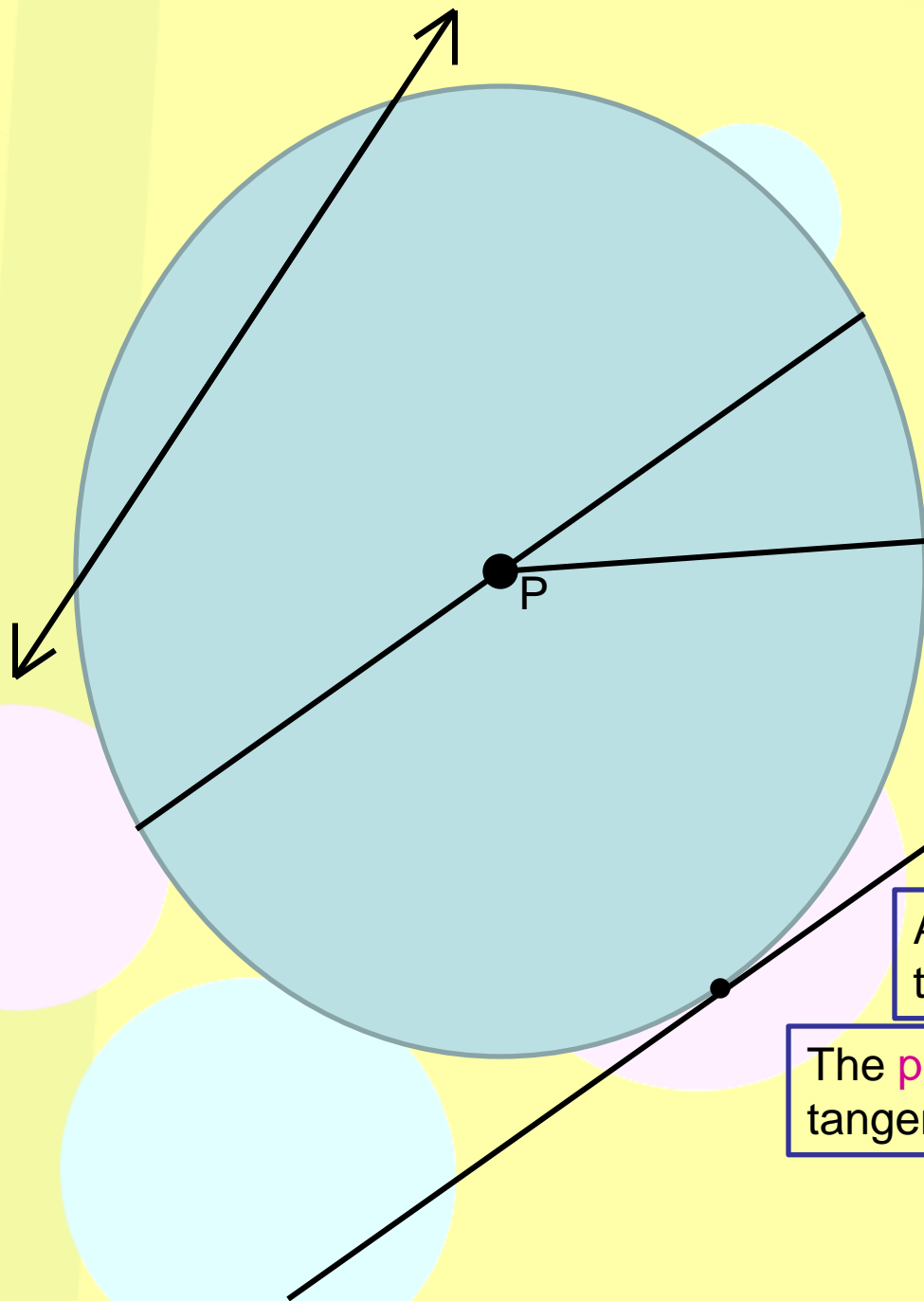
4. 21

2. 3

5. 30°

3. 40°

6. 100°



This is **circle P**. It is named by its center. The center is also known as the vertex of the circle.

A **chord** is a line segment that touches a circle in 2 places.

The **diameter** is a **chord** that goes through the middle of the circle.

The **radius** is a line segment that touches the center and side of the circle.

A **secant** is a line that touches a circle in 2 places.

A **tangent** to a circle is a line that touches a circle in exactly one point.

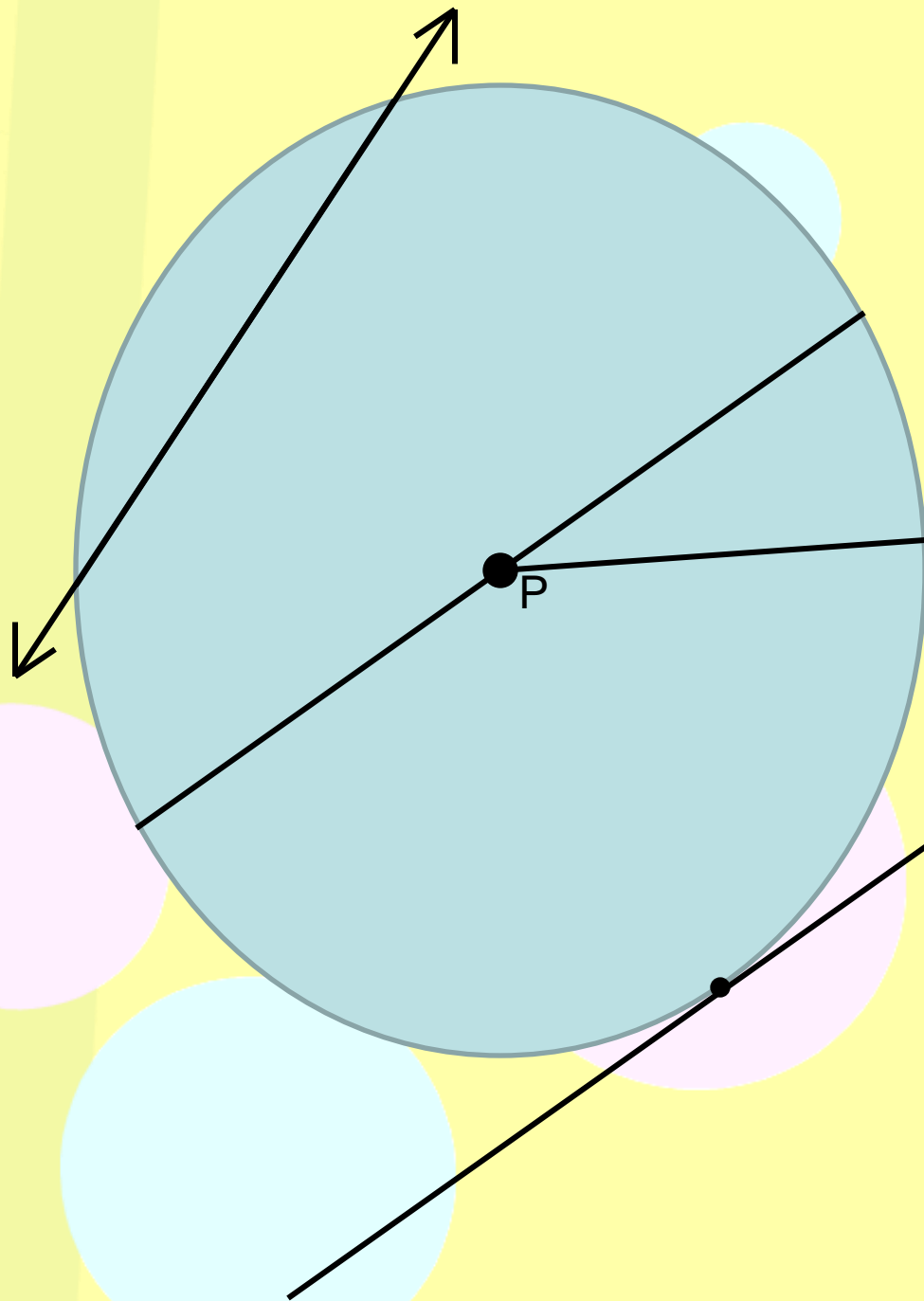
The **point of tangency** is where the tangent line touches the circle.

NOTATION

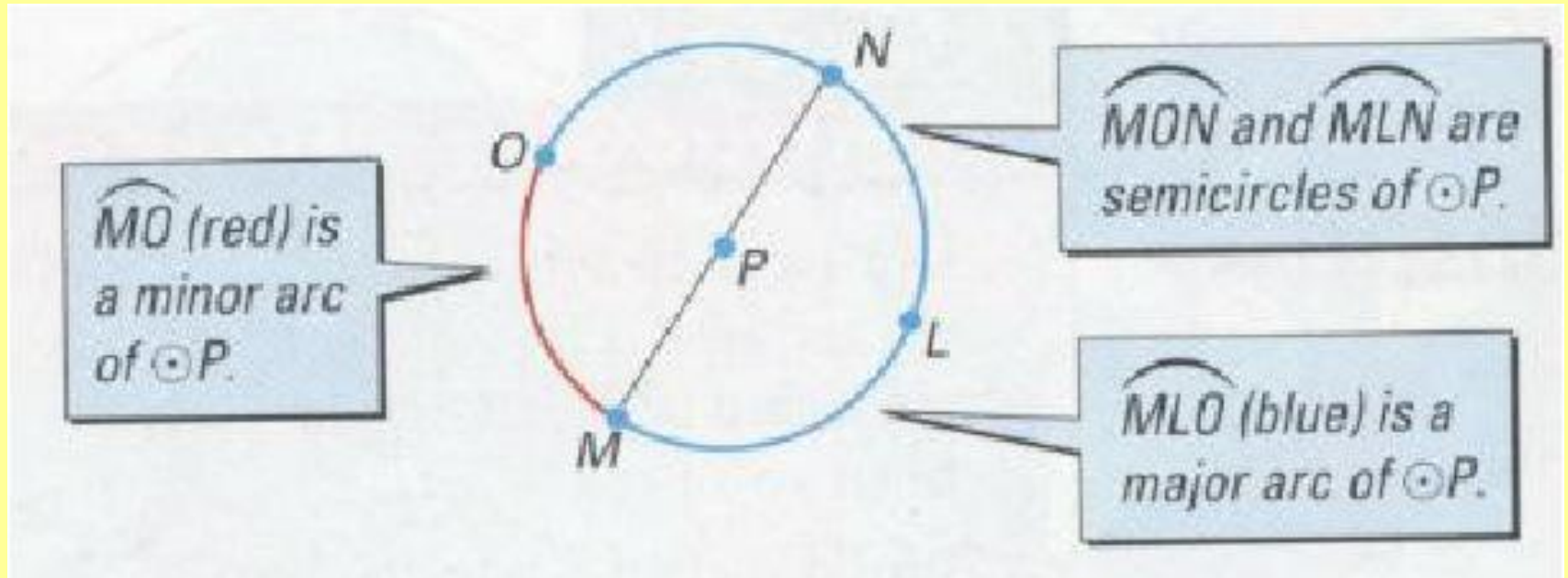
All of the pieces we just talked about are either lines, segments, or points. We will use regular notation.

However we will write Circle P as:

$\odot P$

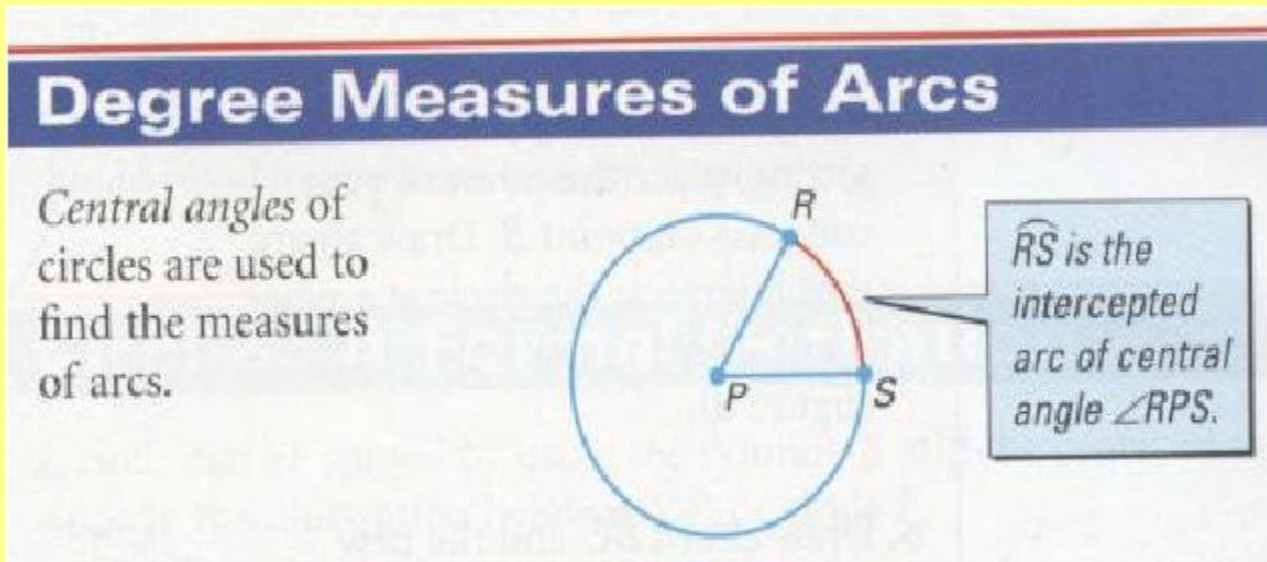


Arc Notation and Description



- ♥ A **minor arc** is labeled with 2 capital letters which are the endpoints and measures less than 180° .
- ♥ **Major arcs** and **semicircles** are labeled with 3 letters – the endpoints and any ONE point in between.
 - ♥ Semicircle = 180°
 - ♥ Major arc is greater than 180°

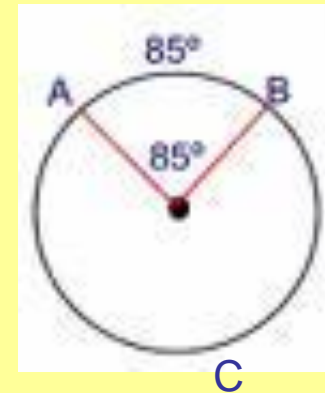
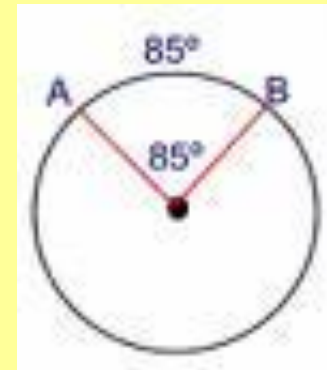
Degree Measures of Arcs



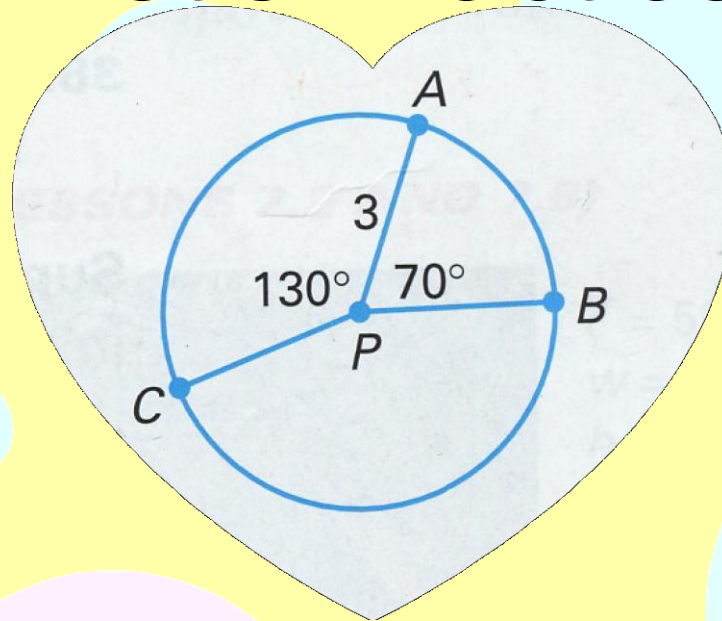
- ♥ A **central angle** is formed by the intersection of 2 segments at the center of a circle.
- ♥ The endpoints of the segment that intersect the edge of the circle are the endpoints of the **intercepted arc**.

Arcs can be measured in terms of degrees.

- The degree measure of a **minor arc** is the measure of its central angle.
- The degree measure of a **major arc** is 360° minus the degree measure of its minor arc. (In this case the major arc ACB would be $360^\circ - 85^\circ = 275^\circ$)
- The degree measure of a **semicircle** is 180° .



Let's Practice



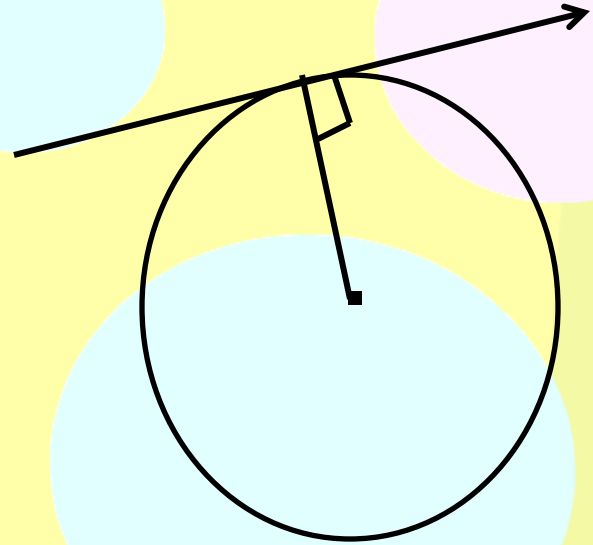
- ♥ Degree measure of arc $AB = 70^\circ$
- ♥ Degree measure of arc $CA = 130^\circ$
- ♥ Degree measure of arc $BC = 160^\circ$
- ♥ Degree measure of arc $BAC = 200^\circ$
- ♥ Length of arc $AB = 3.66$ units

Quick Review

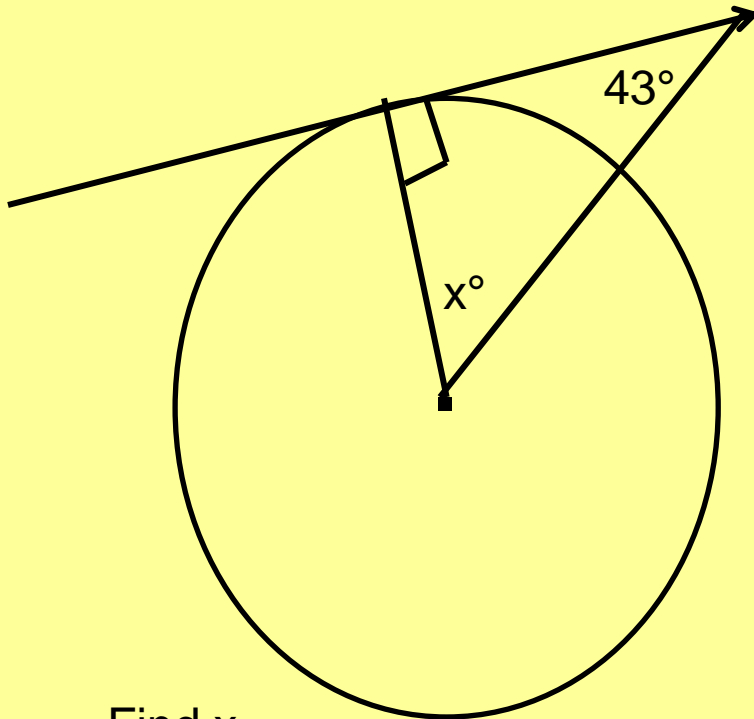
- 1) What is a radius of a circle?
- 2) What is a chord of a circle?
- 3) What is the diameter of a circle?
- 4) Is the diameter of a circle a chord?
- 5) What is the notation for a minor arc?
- 6) What is the notation for a major arc?
- 7) What is a semicircle?
- 8) What is the notation for a semicircle?
- 9) What is the notation for 'circle P'?
- 10) What is an intercepted arc?
- 11) What is a central angle?
- 12) If a central angle is 43° what is the measure of the intercepted arc?

Tangent Lines

Rule #1: If a line is tangent to a circle, then it is perpendicular to the radius at the point of tangency.

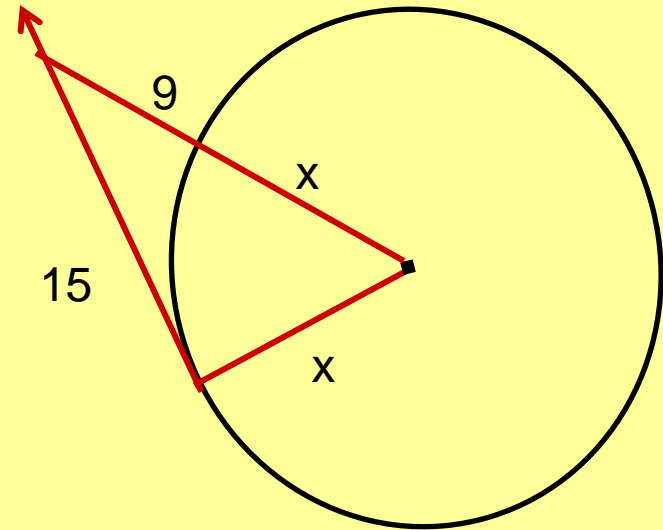


Let's use our new rule



Find x

$$x = 47^\circ$$



Find x

$$x^2 + 15^2 = (x+9)^2$$

$$x^2 + 225 = x^2 + 18x + 81$$

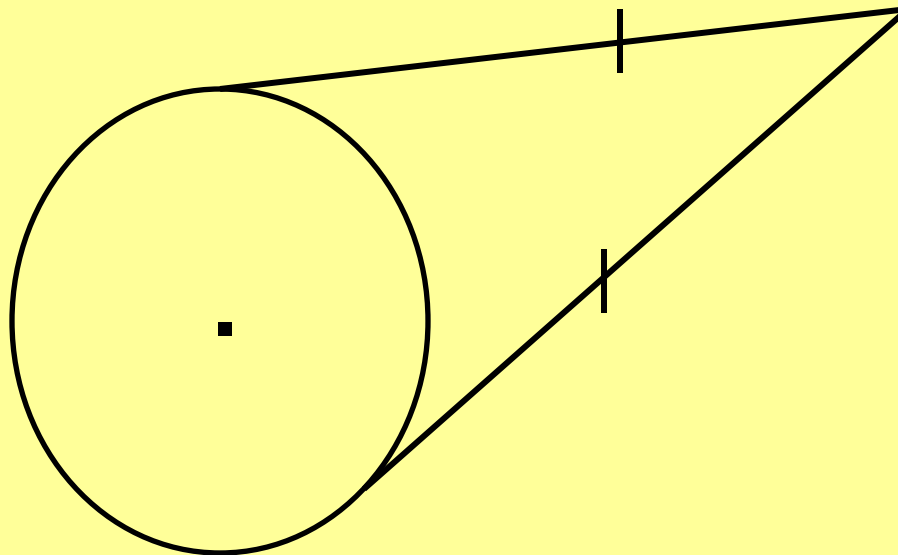
$$225 = 18x + 81$$

$$144 = 18x$$

$$8 = x$$

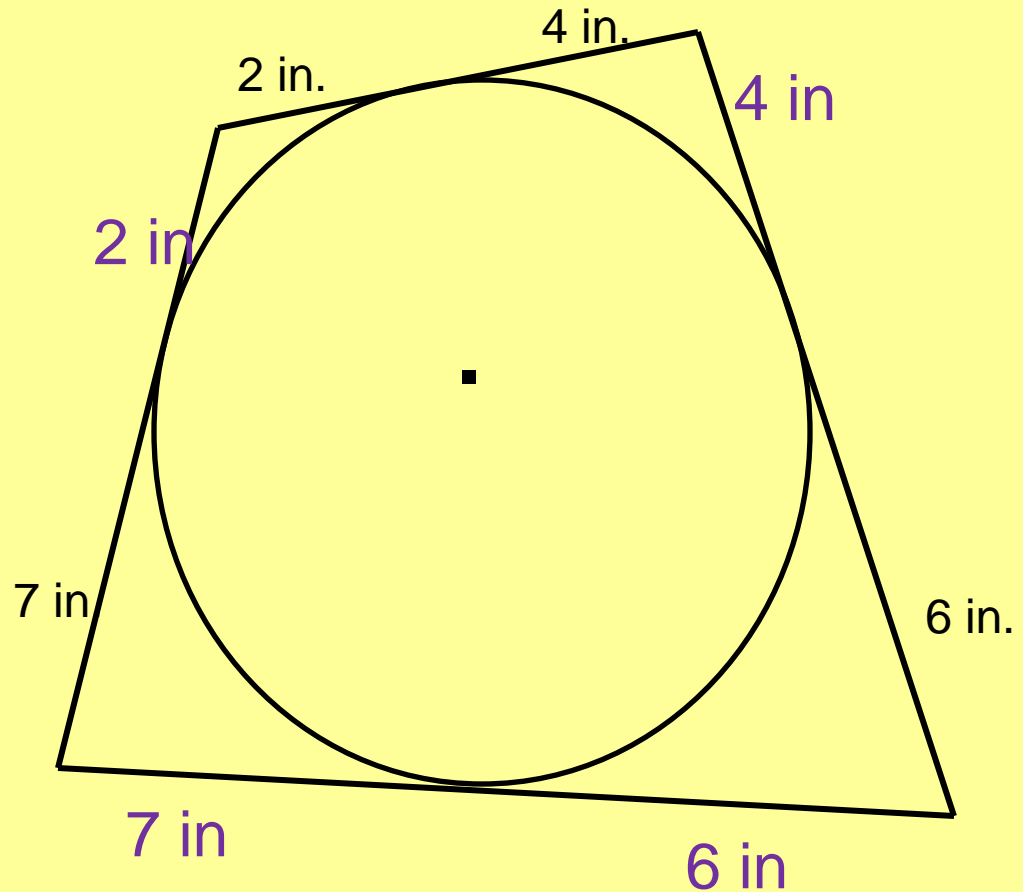
Tangent Lines

Rule #2: If two tangent segments share a common endpoint, then the two segments are congruent.



Try this....

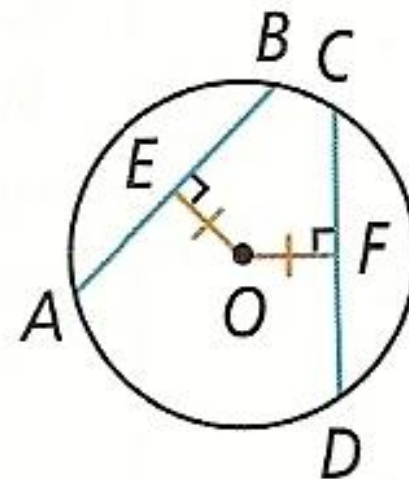
The polygon circumscribes the circle. Find the perimeter of the polygon.



$$P = 38 \text{ in}$$

Chords and Arcs

Rule #1: Chords equidistant from the center are congruent



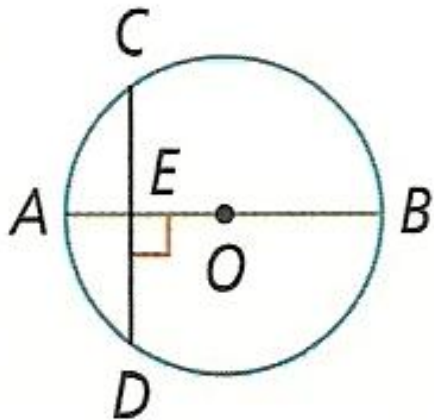
If $OE = OF$, then $\overline{AB} \cong \overline{CD}$.

If $\overline{AB} \cong \overline{CD}$, then $OE = OF$.

Rule #2: If a diameter is perpendicular to a chord, then it bisects the chord and its arc

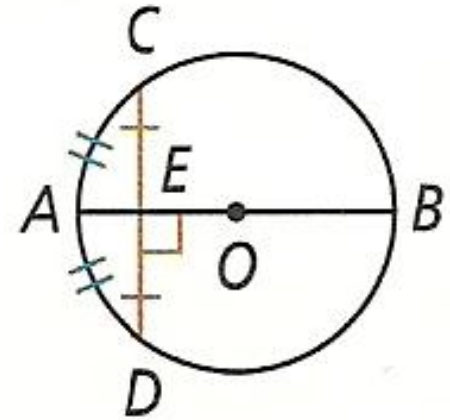
If . . .

\overline{AB} is a diameter and $\overline{AB} \perp \overline{CD}$



Then . . .

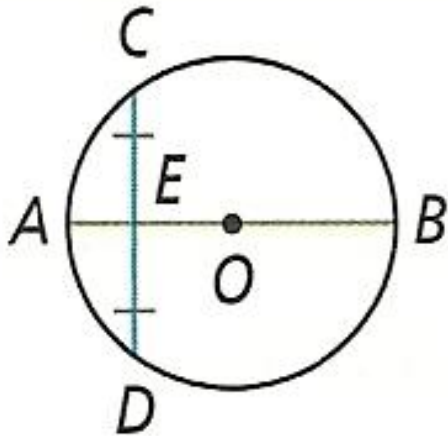
$\overline{CE} \cong \overline{ED}$ and $\widehat{CA} \cong \widehat{AD}$



Rule #3: If a diameter bisects a chord (not a diameter), then it is perpendicular to the chord.

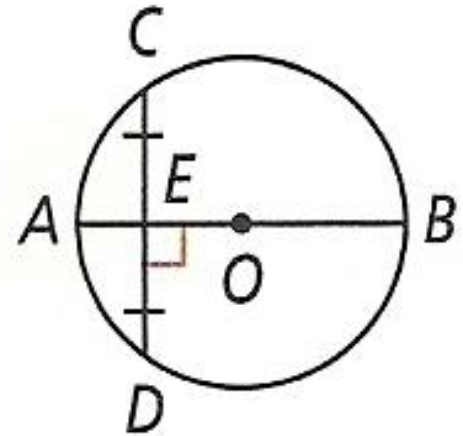
If . . .

\overline{AB} is a diameter and $\overline{CE} \cong \overline{ED}$



Then . . .

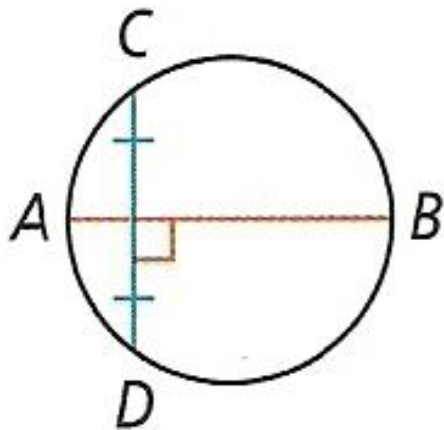
$\overline{AB} \perp \overline{CD}$



Rule #4: The perpendicular bisector of a chord contains the center of the circle.

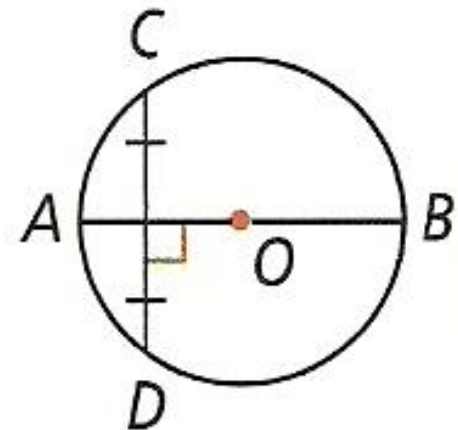
If . . .

\overline{AB} is the perpendicular bisector of chord \overline{CD}

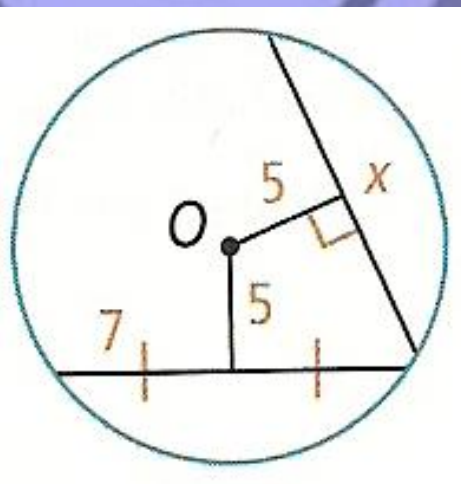


Then . . .

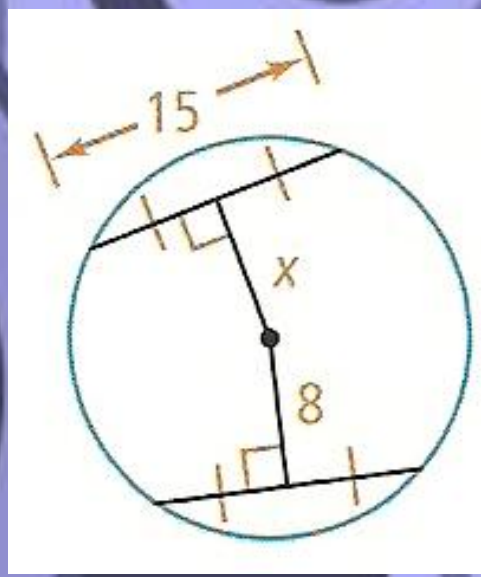
\overline{AB} contains the center of $\odot O$



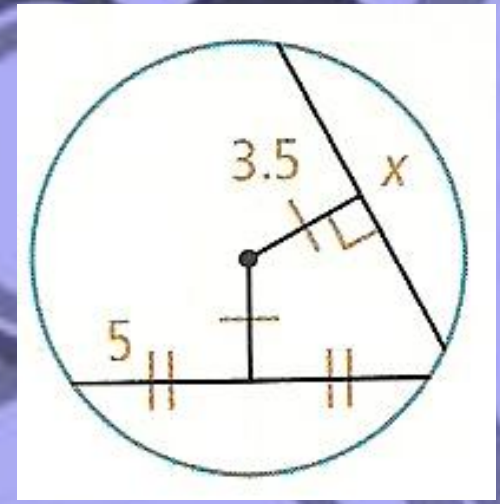
Let's play with our new best friends



$$X = 14$$

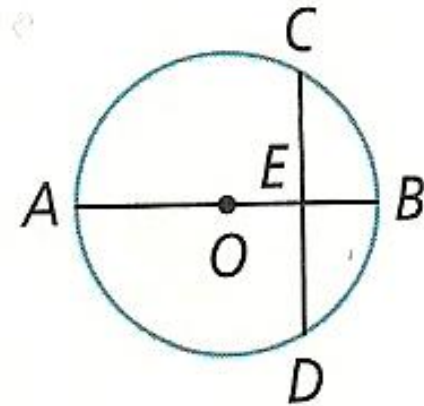


$$X = 8$$

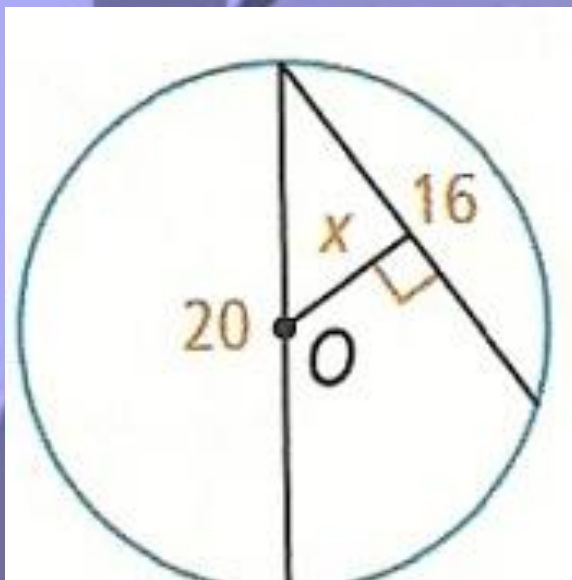


$$X = 10$$

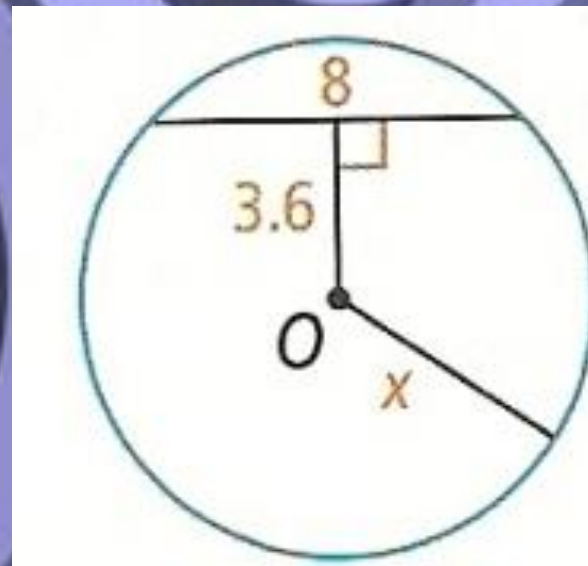
In $\odot O$, \overline{AB} is a diameter of the circle and $\overline{AB} \perp \overline{CD}$. What conclusions can you make?



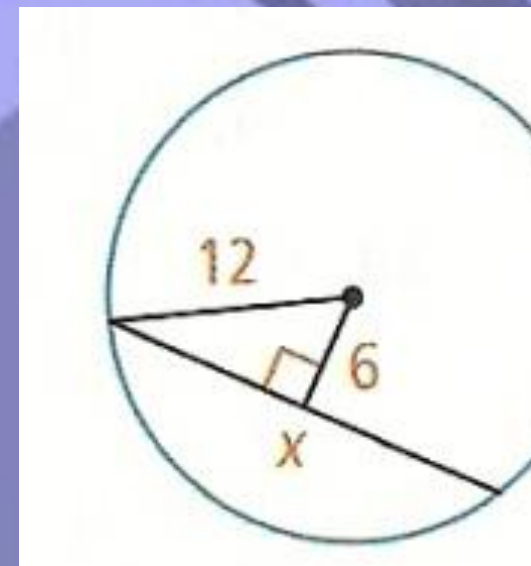
Find the value of x to the nearest tenth.



$$X = 6$$



$$X = 5.4$$



$$X = 20.8$$



Your
assignment

*12-1 Practice
(Tangent Lines)

*12-2 Practice
(Chords and Arcs)