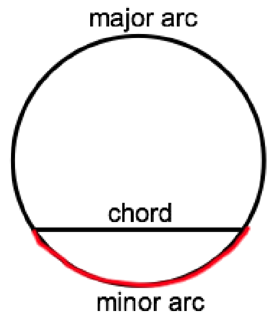
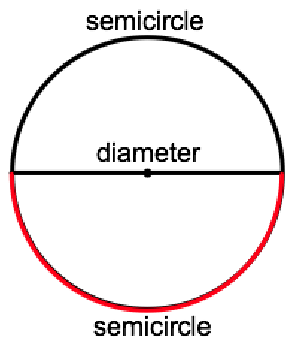
Chords

Recall from Lesson 6.1 that a chord is a segment with both endpoints on the circle. Because it's endpoints are on the circle, any chord divides the circle in two arcs, a major arc and a minor arc.



A diameter is chord that goes through the center of the circle. A diameter also divides any circle into two arcs, however these arcs are both semicircles.



In a circle, there are several relationships between chords and arc length.

[Activity #1]: a quick demonstration linking chord length to arc length.

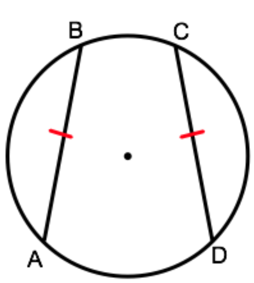
$\overline{BC}$ and $\overline{DE}$ are chords on $\odot A$. Drag points *B*, *C*, *D*, and *E* around to adjust the length of the chords or arcs.

$\overset{\frown}{BC}$ (the blue arc) and $\overset{\frown}{DE}$ (the green arc) are the arcs associated with the two segments. Use the activity to answer the following questions. As you answer, discuss them with a partner.

1. Make $\overline{BC}$ and $\overline{DE}$ equal in length. How are the arcs related? Try this for a few lengths of $\overline{BC}$ and $\overline{DE}$ to verify your hypothesis.
2. Make $\overline{BC}$ and $\overline{DE}$ unequal in length. Does the longer chord or the shorter chord have the longer arc?

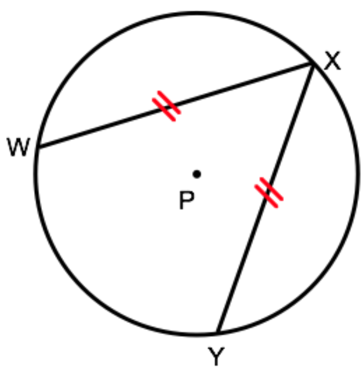
THEOREM 6.3:

In the same circle, or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.



In other words, $\overset{\frown}{AB} \cong \overset{\frown}{CD}$ if and only if $\overline{AB} \cong \overline{CD}$.

Example #1:
Use $\odot P$ to find the following:



(A) If $m\widehat{XW} = 120^\circ$, find $m\widehat{XY}$.

(B) If $m\widehat{WY} = 168^\circ$, find $m\widehat{XY}$.