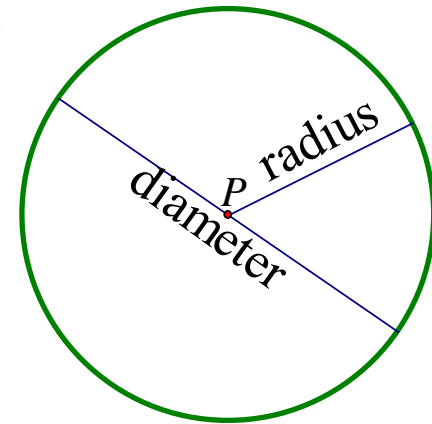


# Central and Inscribed Angles

Def. A circle is a set of all points in a plane that are a given distance from a point. This point is called the center.

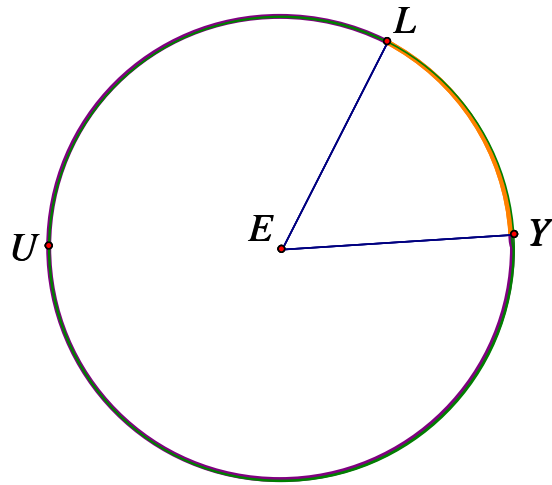
Def. A radius of a circle is a segment with one endpoint at the center and the other endpoint on the circle.

Def. A diameter of a circle connects two points on the circle and passes through the center.



This is  $\odot P$

Def. A central angle is an angle whose vertex is the center of a circle. The angle will create two arcs on the circle.



$\angle LEY$  is a central angle

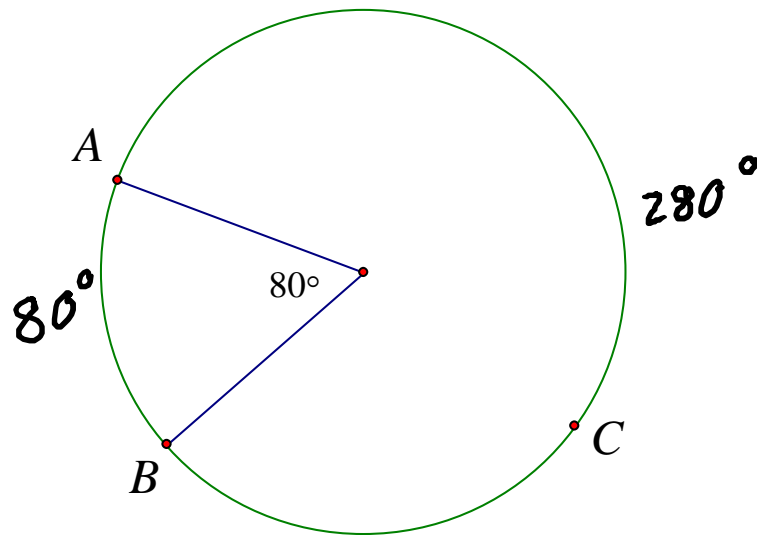
$\widehat{LY}$

$\widehat{LY}$  is a minor arc because its measure is less than  $180^\circ$

$\widehat{LYU}$  is a major arc because its measure is greater than  $180^\circ$

- An arc is measured by its central angle

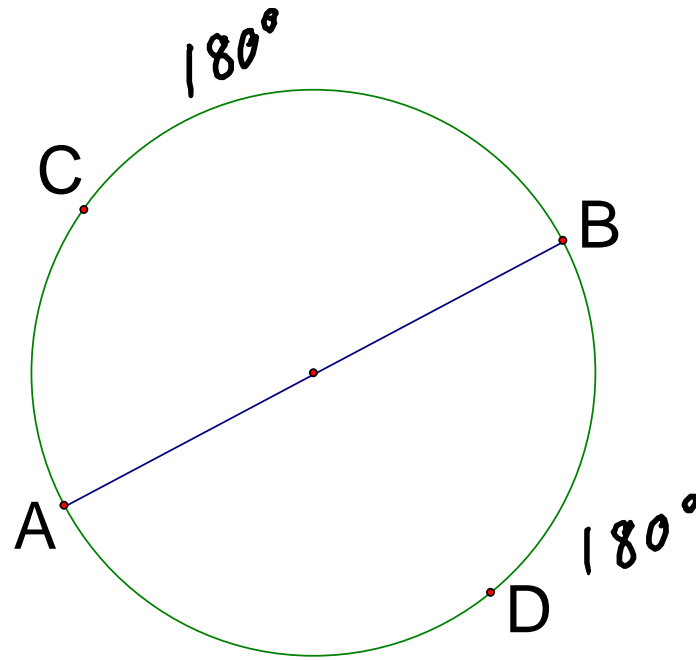
Ex. Find  $m\widehat{AB}$  and  $m\widehat{ACB}$



central angle = arc

$$\begin{array}{r} 360 \\ - 80 \\ \hline 280 \end{array}$$

Def. The endpoints of the diameter of a circle separates the circle into two arcs called semicircles.



Pencils down! Can you identify each arc listed as major, minor or semi circle?

Assume  $\overline{MQ}$  and  $\overline{NR}$  are diameters

1.  $\widehat{MN} = 73^\circ$

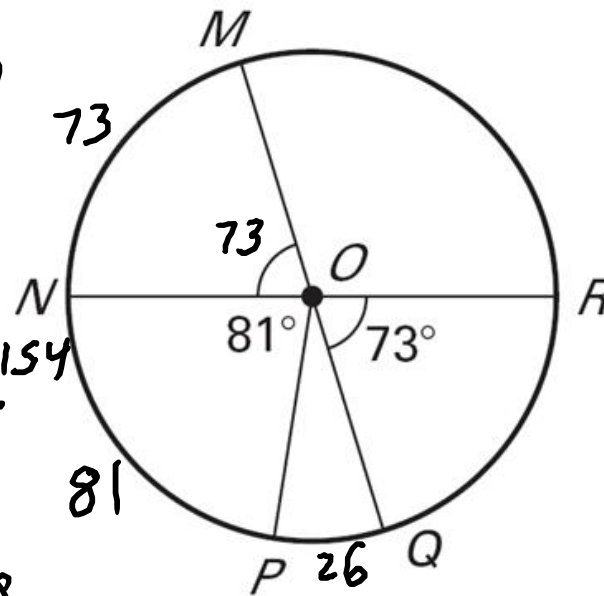
2.  $\widehat{MP} = 73 + 81$   
 $= 154$

3.  $\widehat{NQ} = 81 + 26$   
 $= 107$

4.  $\widehat{MRP} = 360 - 154$   
 $= 206$

5.  $\widehat{MRN} = 360 - 73$   
 $= 287$

6.  $\widehat{MNQ} = 180$



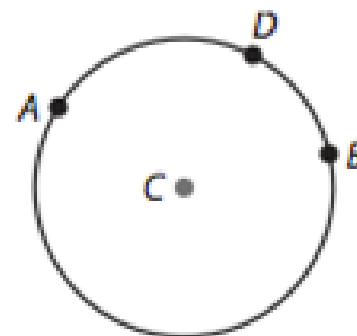
$$\begin{array}{r} 180 \\ -154 \\ \hline 26 \end{array}$$

Now can you figure out their measures?

## Arc Addition Postulate

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

$$m\widehat{ADB} = m\widehat{AD} + m\widehat{DB}$$

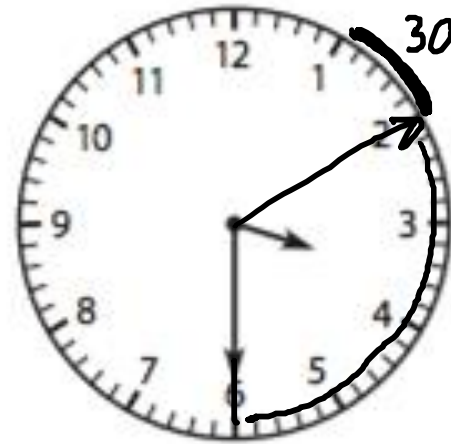


The minute hand of a clock sweeps out an arc as time moves forward. From 3:10 p.m. to 3:30 p.m., what is the measure of this arc? Explain your reasoning.

$$\frac{360}{12} = 30$$



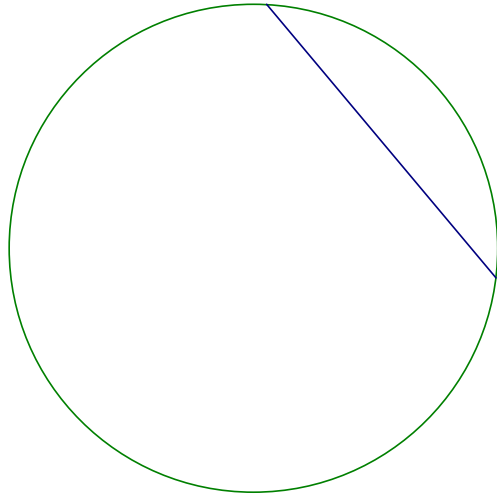
3:10



3:30

30(4) = 120°

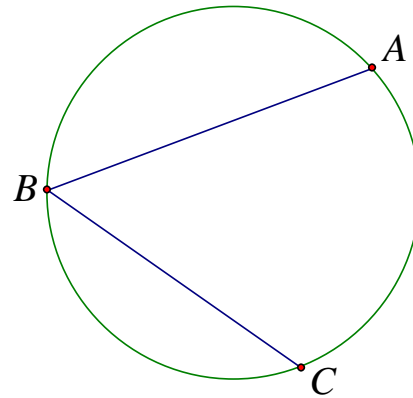
A chord is a segment that connects two points on a circle.





Remember, central angles have their vertex at the center of the circle.

Def. An inscribed angle is an angle whose vertex is on a circle and whose sides are chords.



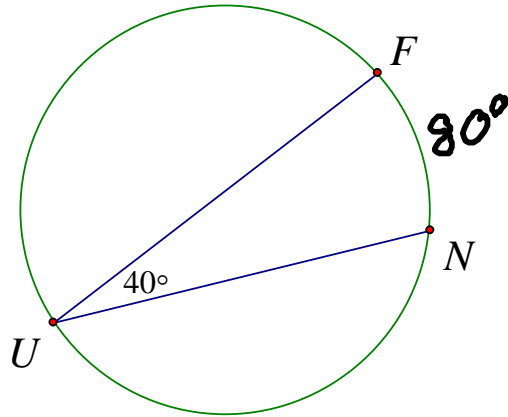
Notice that it contains  $\widehat{AC}$

Remember, the measure of an arc is the same as its central angle.

What if it's created by an inscribed angle?

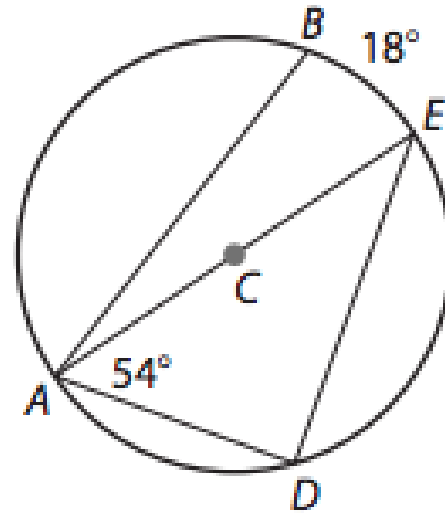
Thm. The measure of an inscribed angle is half the measure of its intercepted arc.

Ex.

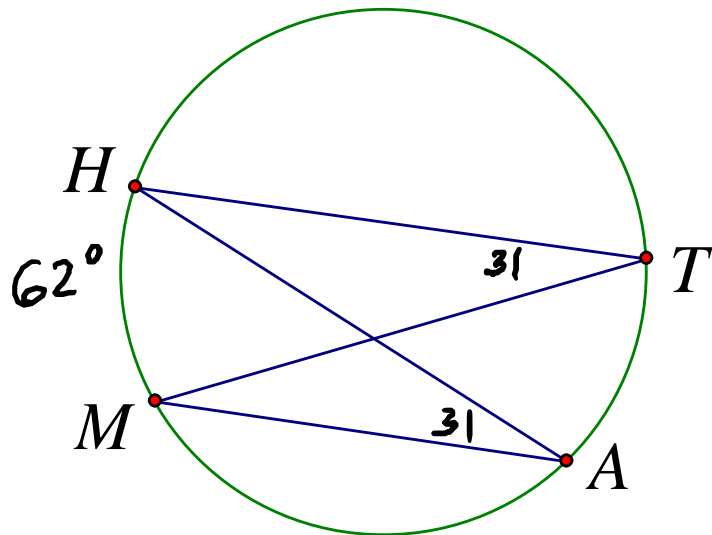


$$\text{inscribed angle} = \frac{1}{2} (\text{arc})$$

How many more angle or arc measures can we find?

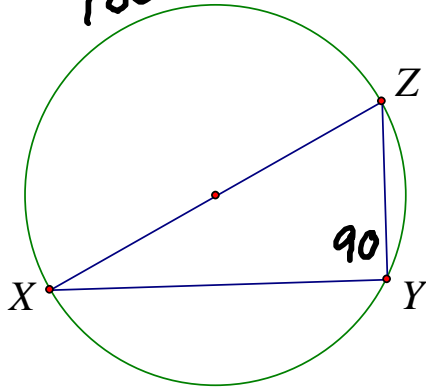


Ex. If  $m\angle MAH = 31^\circ$ , find  $m\angle MTH$ .



Thm. Two inscribed angles that contain the same arc are congruent.

Ex. If  $\overline{ZX}$  is a diameter, find  $m\angle XYZ = 90$

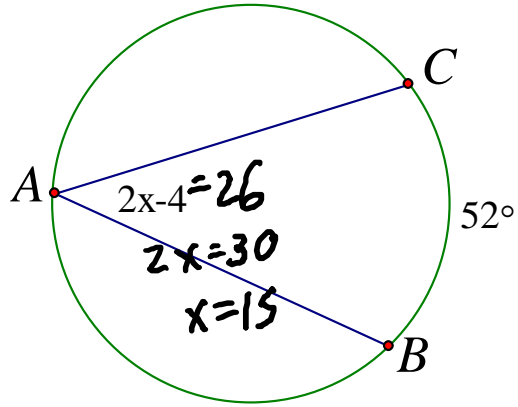


Thm. If an inscribed angle cuts off a semicircle, then it is a right angle.

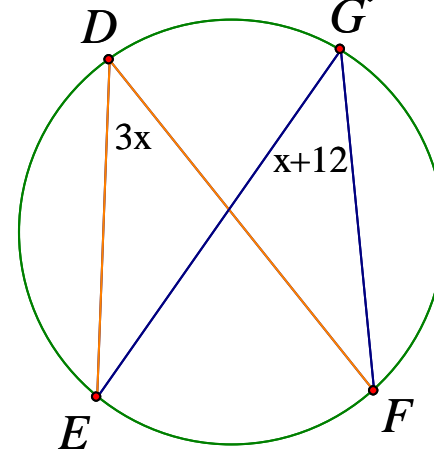
Pract. Find  $x$  in each circle.

Angle =  $\frac{1}{2}$ (arc)

1.



2.



$$\begin{aligned} 3x &= x + 12 \\ 2x &= 12 \\ x &= 6 \end{aligned}$$

3.

