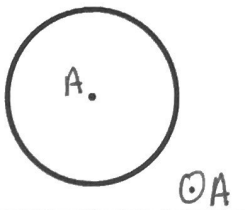
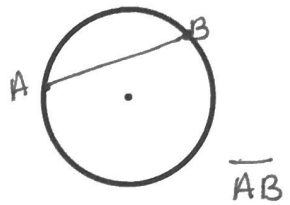
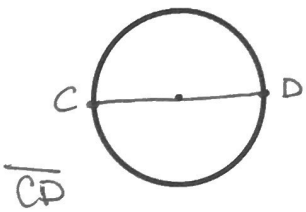
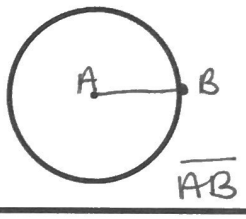
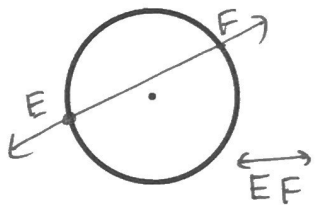
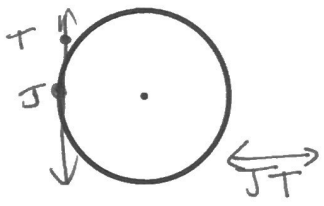
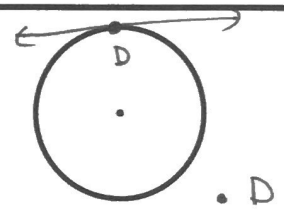
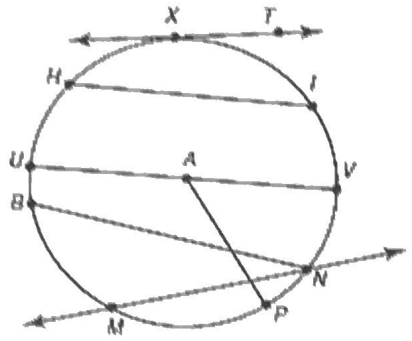
Intro to Circles and Arcs

Circle	The set of all points in a plane that are equidistant (the length from the radius) from a given point. Center is • A	
Chord	A **segment** on the ***interior*** of a circle whose endpoints are **on** the circle.	
Diameter	A **segment** between two points on a circle, which ***passes through the center of the circle***. The **LONGEST chord** of a circle.	
Radius	The **segment** between the center and a point on the circle	
Secant	A **line** that intersects a circle at ***two points*** on the circle.	
Tangent	A **line** that intersects a circle at ***exactly one point*** on the circle.	
Point of Tangency	A point on the circle where the tangent line touches the circle.	

Circles have 360° **degrees.** **Semicircles have** 180° **degrees.**

Example: Name all the parts of the circle:



Radii: $\overline{AU}$, $\overline{AV}$, $\overline{AP}$

Diameter: $\overline{UV}$

Chords: $\overline{HI}$, $\overline{BN}$, $\overline{MN}$

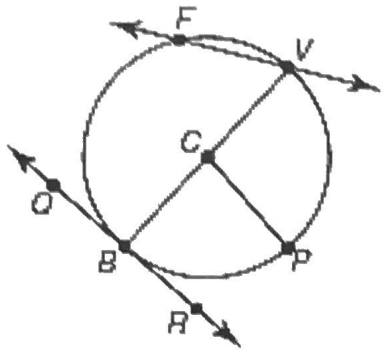
Secant: $\overleftrightarrow{MN}$

Tangent: $\overleftrightarrow{XT}$

Point of Tangency: $\bullet X$

Practice:

1. Name the following parts of the circle:



Circle: $\odot C$

Center: $\bullet C$

Diameter: $\overline{BV}$

All Chords ~~Chords~~: $\overline{FV}$, $\overline{BV}$

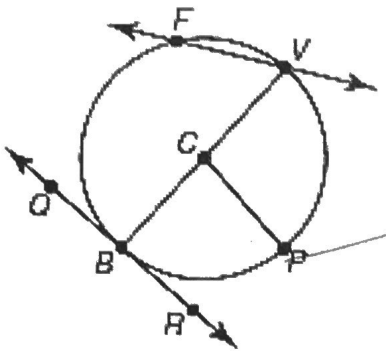
Point of Tangency: $\bullet B$

Tangent : $\overleftrightarrow{QR}$, $\overleftrightarrow{QB}$, $\overleftrightarrow{BR}$

Secant: $\overleftrightarrow{FV}$

All Radii: $\overline{BC}$, $\overline{CV}$, $\overline{CP}$

2. Use the diagram to answer the following:



Circle:

Center:

Diameter:

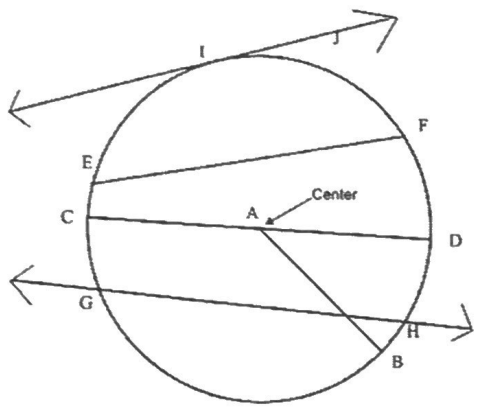
All Chords: All Radii:

Point of Tangency:

Tangent :

Secant:

Example: Name all the parts of the circle:



Radii: $\overline{AC}$, $\overline{AD}$, $\overline{AB}$

Diameter: $\overline{CD}$

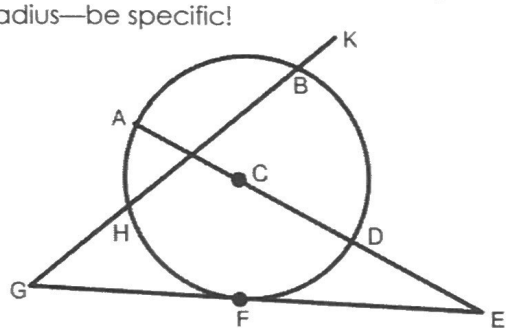
Chords: $\overline{EF}$, $\overline{GH}$

Secant: $\overleftrightarrow{GH}$

Tangent: $\overleftrightarrow{IJ}$

Point of Tangency: • I

EXAMPLE: Tell whether the line or segment is best described as a chord, a secant, a tangent, a diameter, or a radius—be specific!



a. $\overline{AD}$ Diameter (chord)

b. $\overline{CD}$ Radius

c. $\overline{EG}$ tangent

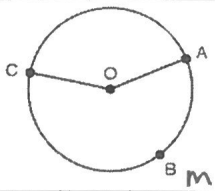
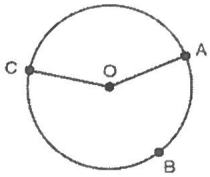
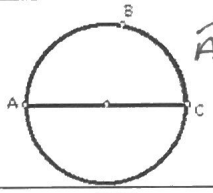
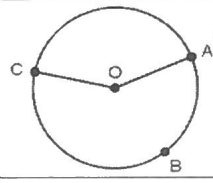
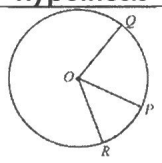
d. $\overline{HB}$ Chord

e. $\overline{FB}$ - nothing
$\overline{AC}$ - Radius

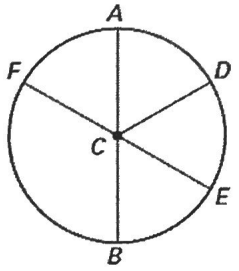
g. $\overline{FE}$ tangent

Arcs & Central Angles

An **arc** is an unbroken part of a circle consisting of two points called the endpoints and all the points on the circle between them.

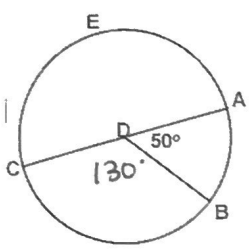
Arc or Angle	Definition	Measure	Picture
Minor Arc	An arc whose points are on or in the interior of a central angle. Minor arcs are less than 180° and only use two letters to name them.	The measure of a minor arc is equal to the measure of the central angle.	 $\overset{\frown}{AB}$ $m\overset{\frown}{CA} = m\angle COA$
Major Arc	An arc whose endpoints are on or in the exterior of a central angle. Major arcs are between 180° and 360°. Three letters are used to name a major arc.	The measure of a major arc is equal to 360° minus the measure of its central angle or minor arc.	 $\overset{\frown}{ABC} = 360° - m\angle COA$
Semicircle	An arc whose endpoints lie on a diameter. Semicircles are named using three letters.	The measure of a semicircle is 180°.	 $\overset{\frown}{ABC}$
Central Angle	An angle whose vertex is the center of the circle.	The measure of a central angle is equal to the measure of its minor arc.	 $\angle COA = \overset{\frown}{CA}$
Name	**Theorem**	**Hypothesis**	**Conclusion**
Arc Addition Postulate	The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs.		$\overset{\frown}{QP} + \overset{\frown}{PR} = \overset{\frown}{QR}$

Example: Identify the following arcs are minor, major, or semicircle.



1. $\overset{\frown}{AE}$ Minor
2. $\overset{\frown}{FDE}$ Semi-circle
3. $\overset{\frown}{FA}$ minor
4. $\overset{\frown}{DFB}$ Major

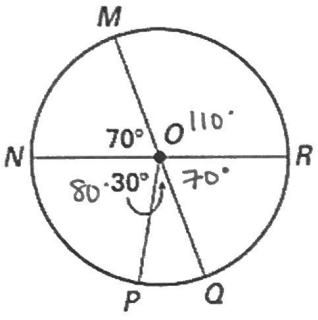
Example: Find the measure of the following:



1. $m\overset{\frown}{AB} = 50°$
2. $m\overset{\frown}{BC} = 130°$
3. $m\overset{\frown}{AEC} = 180°$
4. $m\overset{\frown}{BCA} = 310°$

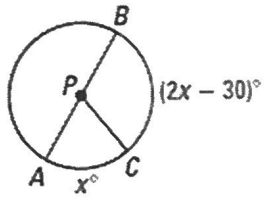
130+180

Example: Find the measure of the following:



1. $m\overset{\frown}{MN} = 70°$
2. $m\overset{\frown}{NQ} = 110°$
3. $m\overset{\frown}{NQR} = 180°$
4. $m\overset{\frown}{MRP} = 210°$
5. $m\overset{\frown}{QR} = 70°$
6. $m\overset{\frown}{MR} = 110°$
7. $m\overset{\frown}{QMR} = 290°$
8. $m\overset{\frown}{PQ} = 30°$
9. $m\overset{\frown}{PRN} = 280°$
10. $m\overset{\frown}{MQN} = 290°$

Example: Find the value of x. Then find the measure of arc BC.



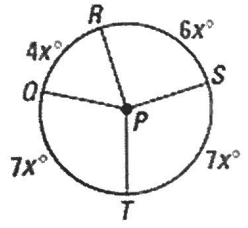
$x + 2x - 30 = 180$

$3x = 210$

$x = 70$

$2(70) - 30 = 110°$ $\quad m\overset{\frown}{BC} = 110°$

Example: Find the value of x. Then find the measure of all central angles and arcs.



$4x + 6x + 7x + 7x = 360$

$24x = 360$

$x = 15$