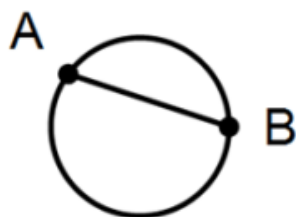


Section 12.1

Objective: circle vocabulary, arc and angle measures (Notes)

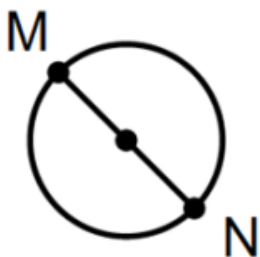
Circle: All points in a plane that are the same distance from a given point, called the *center* of the circle.

Chord: A segment with both endpoints on a circle.



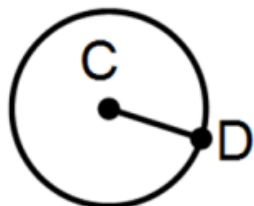
\overline{AB} is a chord.

Diameter: A chord that passes through the center of a circle.



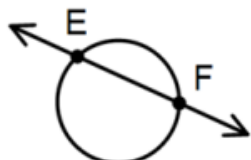
\overline{MN} is a diameter.

Radius: A segment with one endpoint on the circle and one endpoint at the center of the circle.



\overline{CD} is a radius.

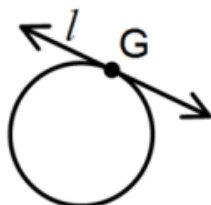
Secant: A line that intersects a circle at two points.



\overline{EF} is a secant.

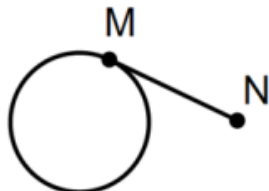
Tangent: A line in the plane of the circle that intersects a circle at exactly one point.

Point of Tangency: The point where a tangent intersects a circle.



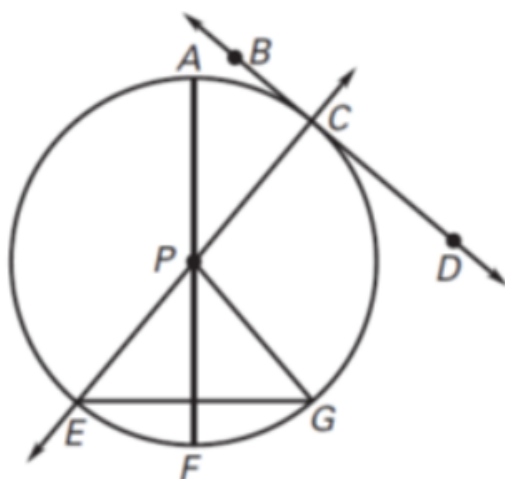
Line l is a tangent. G is the point of tangency.

Tangent Segment: A segment that touches a circle at one of its endpoints and lies in the line that is tangent to the circle at that point.



\overline{MN} is a tangent segment.

Example: In circle P , name the term that best describes the given line, segment, or point.



\overline{AF} diameter

\overline{EG} chord

\overline{PF} radius

\overline{PG} radius

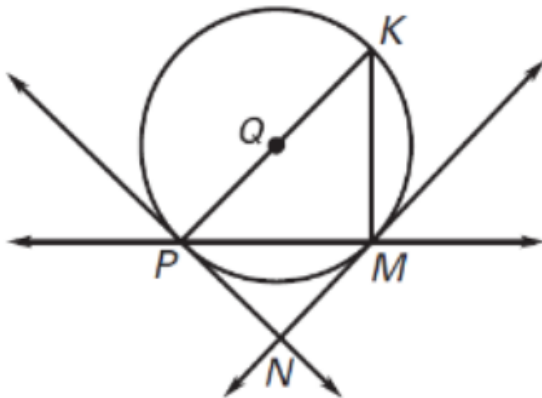
C point of tangency

\overline{CE} secant

\overline{BD} tangent line

P center of circle

Example: In $\odot Q$, identify a chord, a diameter, two radii, a secant, two tangents, and two points of tangency.



Chord: \overline{PM} , \overline{KM}

Radii: \overline{QK} , \overline{QP}

Tangents: \overleftrightarrow{MN} , \overleftrightarrow{PN}

Diameter: \overline{PK}

Secant: \overleftrightarrow{PM}

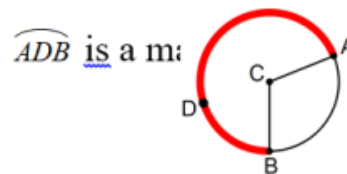
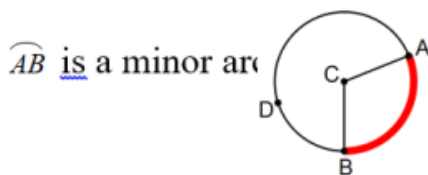
Points of tangency:

M for tangent line \overleftrightarrow{MN}
 P for tangent line \overleftrightarrow{PN}

Central Angle: An angle in a circle whose vertex is the center of the circle and whose sides are radii of the circle

Minor Arc: All the points on a circle that lie in the interior of a central angle whose measure is less than 180° .

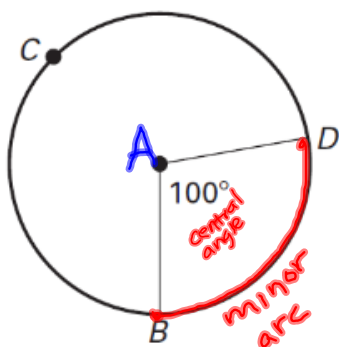
Major Arc: All the points on a circle that do not lie on the corresponding minor arc.



Measure of a Central Angle: is the measure of the intercepted arc.

Measure of a Minor Arc: is the measure of its central angle.

Measure of a Major Arc: 360° minus the measure of the minor arc.

Example:

Center is
point A

Measure of central angle: 100°

Measure of the minor arc: 100°

Measure of the major arc: 260°

$$360^\circ - 100^\circ = 260^\circ$$

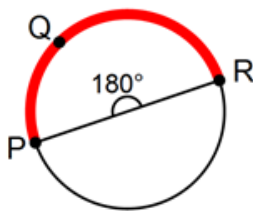
Name the central angle: ∠BAD or ∠DAB

Name the minor arc: \widehat{BD} or \widehat{DB}

Name the major arc: \widehat{DCB} or \widehat{BCD}

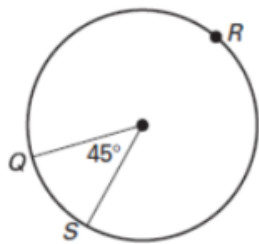
must use 3 letters
in order around circle

Semicircle: An arc whose central angle measures 180° .



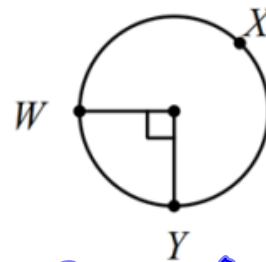
Examples: Name the major and minor arcs and the central angle. Find the measure of each.

a)



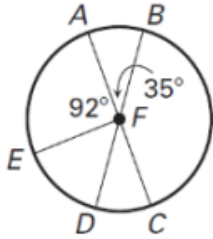
minor arc $\widehat{QS} = 45^\circ$
 major arc \widehat{QRS}
 $360 - 45 = 315^\circ$

b)



minor arc $\widehat{WY} = 90^\circ$
 major arc $\widehat{WXY} = 270^\circ$
 $360 - 90 = 270 \uparrow$

Examples: \overline{AC} and \overline{BD} are diameters. Find the indicated measures.



a) $m\widehat{DC} = 35^\circ$
measure of arc DC

d) $m\widehat{DE} = 53^\circ$

b) $m\widehat{BC} = 145^\circ$

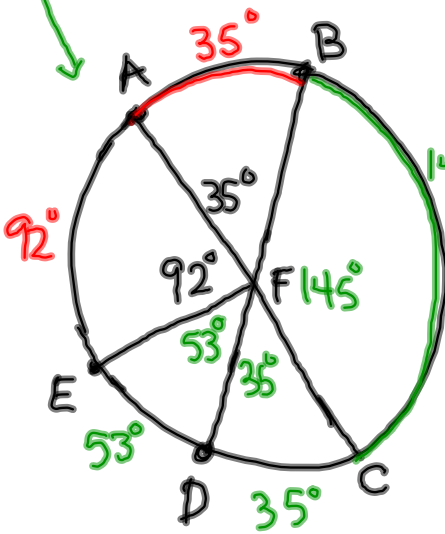
e) $m\widehat{ABE} = 268^\circ$
 $\widehat{AB} + \widehat{BC} + \widehat{CD} + \widehat{DE} = 35 + 145 + 35 + 53 = 268^\circ$
 OR $360 - \widehat{AE} = 360 - 92$

c) $m\widehat{CDE} = 88^\circ$
 $\widehat{CD} + \widehat{DE} = 35 + 53 = 88$

f) $m\widehat{ABD} = 215^\circ$
 $\widehat{AB} + \widehat{BC} + \widehat{CD} = 35 + 145 + 35 = 215^\circ$

From below

Find all the angles and arcs of the circle first then answer the questions.



\overline{DB} is a diameter so

$\widehat{DAB} = 180^\circ$

$m\angle EFD = 180 - 92 - 35 = 53^\circ$

\overline{AC} is a diameter so

$\widehat{ABC} = 180^\circ$

$m\angle BFC = 180 - 35 = 145^\circ$

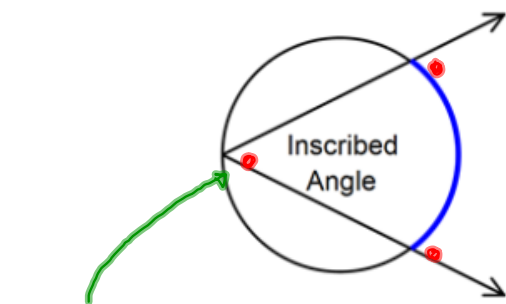
Since \overline{DB} is a diameter

$m\angle DFC = 180 - 145 = 35^\circ$

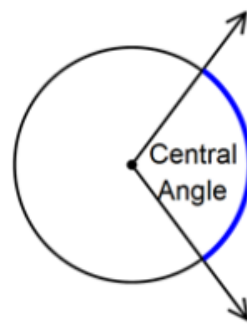
Inscribed Angle: An angle whose vertex is on a circle and whose sides contain chords of the circle.

Intercepted Arc: An arc that lies in the interior of an inscribed angle and has endpoints on the sides of the angle.

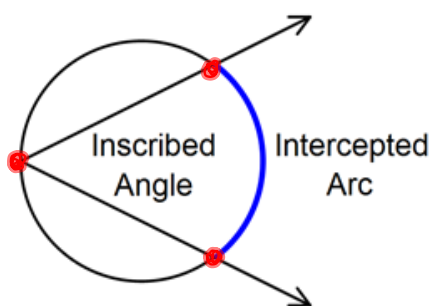
WARNING: Don't get *inscribed* angles and *central* angles mixed up!



vertex of angle is on circle.

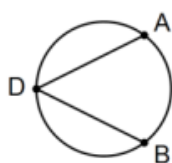


vertex of angle is center of circle



Theorem: If an angle is inscribed in a circle, then its measure is half the measure of its intercepted arc.

Example:

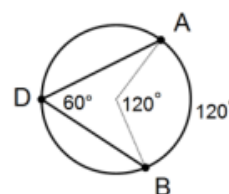


$$m\angle ADB = \frac{1}{2} m\widehat{AB}$$

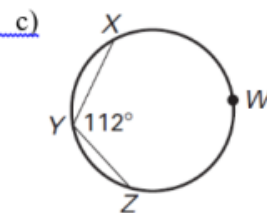
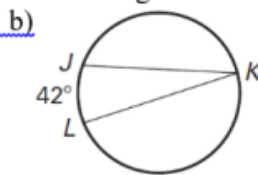
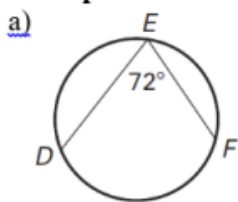
$$m\widehat{AB} = 2m\angle ADB$$

$$m\angle ADB = 60^\circ$$

$$m\widehat{AB} = 120^\circ$$



Examples: Find the measure of the inscribed angle or the intercepted arc.



\widehat{DF} is twice $\angle DEF$

$$m\widehat{DF} = 72(2)$$

$$m\widehat{DF} = 144^\circ$$

arc is 42°
angle is $\frac{1}{2}$ arc

$$m\angle JKL = \frac{1}{2}(42)$$

$$m\angle JKL = 21^\circ$$

angle is 112
angle is inscribed

$$\widehat{XWZ} = 2(\text{angle})$$

$$m\widehat{XWZ} = 2(112)$$

$$m\widehat{XWZ} = 224^\circ$$