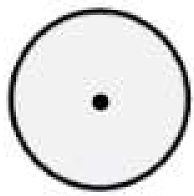
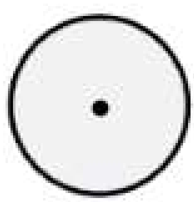
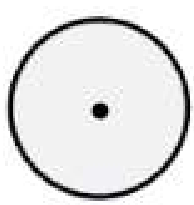
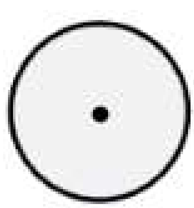
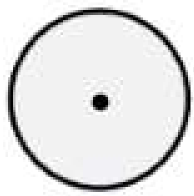
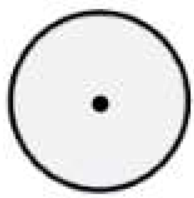
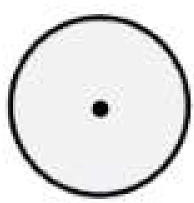
Name: ______________________________________

UNIT 3

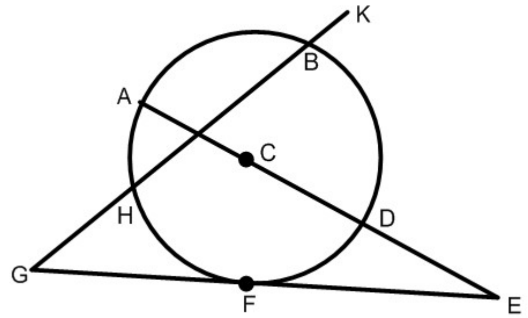
Circle Properties

Circle Terminology

Term	Picture	Definition
Circle		
Radius		
Diameter		
Chord		
Secant		
Tangent		

Term	Picture	Definition
Minor Arc		
Major Arc		
Semicircle		
Central Angle		
Inscribed Angle		

1: Name the following as a chord, a secant, a tangent, a diameter, or a radius—be specific!



a. $\overline{AD}$

b. $\overline{CD}$

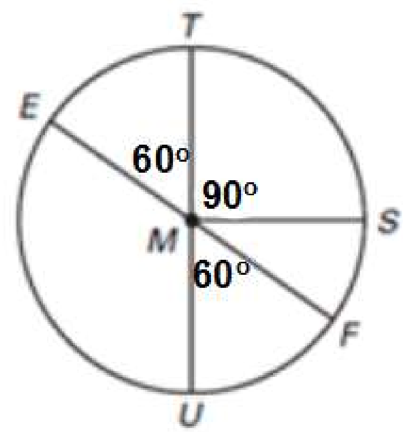
c. $\overline{EG}$

d. $\overline{HB}$

e. $\overline{FB}$

f. $\overline{FE}$

In the following questions, EF and TU are diameters of Circle M. Find the indicated measure.



2. m $\overset{\frown}{ET}$ ____________________

3. m $\overset{\frown}{SF}$ ____________________

4. m $\overset{\frown}{ETS}$ ____________________

5. m $\overset{\frown}{TSF}$ ____________________

6. m $\overset{\frown}{SU}$ ____________________

7. m $\overset{\frown}{EU}$ ____________________

8. $\overset{\frown}{ESF}$ is a ____________________ (minor arc, major arc, semicircle)

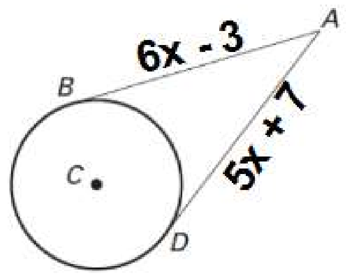
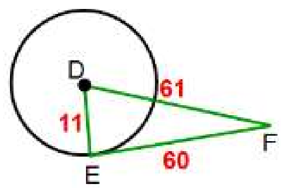
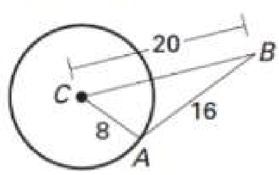
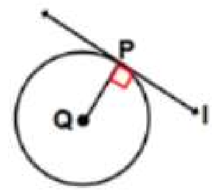
9. $\overset{\frown}{SU}$ is a ____________________ (minor arc, major arc, semicircle)

10. $\overset{\frown}{ETU}$ is a ____________________ (minor arc, major arc, semicircle)

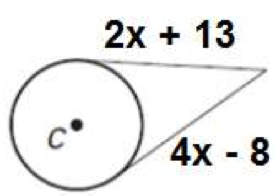
11. $\overset{\frown}{ET}$ is a ____________________ (minor arc, major arc, semicircle)

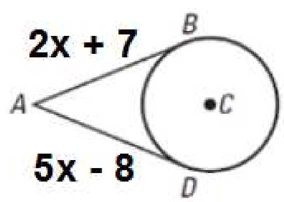
12. $\overset{\frown}{SEU}$ is a ____________________ (minor arc, major arc, semicircle)

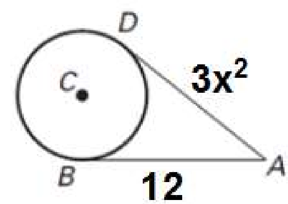
Example 1 – Tangent Properties

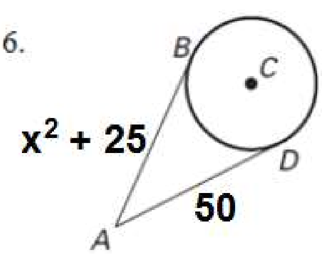
EXAMPLE 1	RULE	WORKED OUT
	2 tangent segments are congruent when they are joined at a common exterior point. Tangent = Tangent	
1. Is $\overline{EF}$ tangent to ⊙D?  2. Is $\overline{AB}$ tangent to ⊙C? 	**<u>Tangent Rule</u>: If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency. If l is tangent to ⊙ Q at P, then l ⊥ $\overline{QP}$.** **<u>Perpendicular Tangent Rule</u>: In a plane, if a line is perpendicular to a radius of a circle at its endpoint on the circle, then the line is tangent to the circle. If l ⊥ $\overline{QP}$ at P, then l is tangent to ⊙ Q.** 	

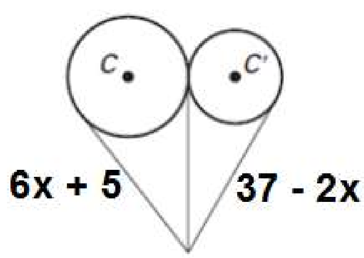
Solve for x using the appropriate property:

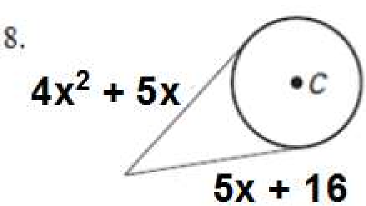
3.


4.


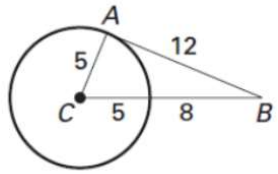
5.


6.


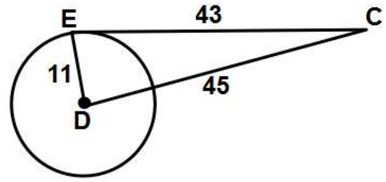
7.


8.


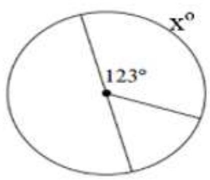
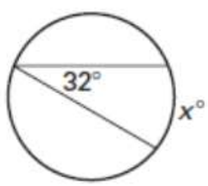
9. Is $\overline{AB}$ tangent to ⊙C?



10. Is $\overline{CE}$ tangent to ⊙D?

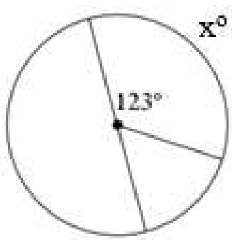


Example 2 – Central and Inscribed Angles

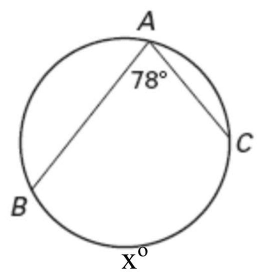
EXAMPLE 2	RULE	WORKED OUT
	A central angle is equal to the intercepted arc. Central Angle = Arc	
	An inscribed angle is ½ the intercepted arc. Arc = 2(Angle) Angle = $\frac{\text{Arc}}{2}$	

Find the missing angle:

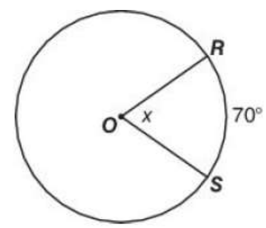
1.



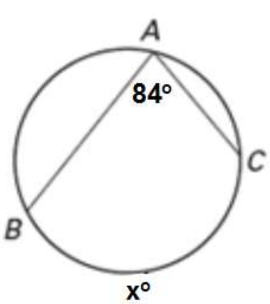
2.



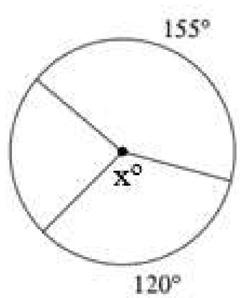
3.



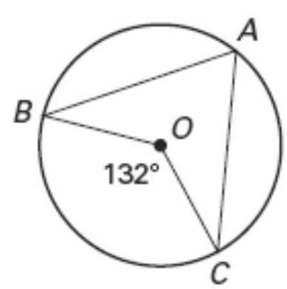
4.



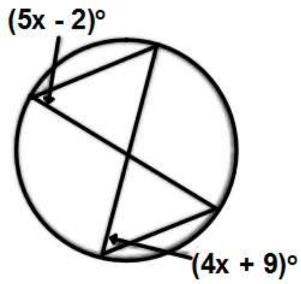
5.



6 $m\angle BAC =$ ___?___

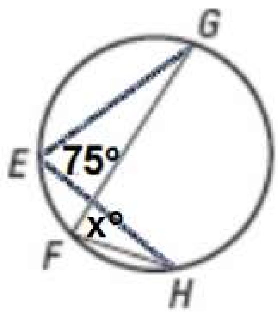


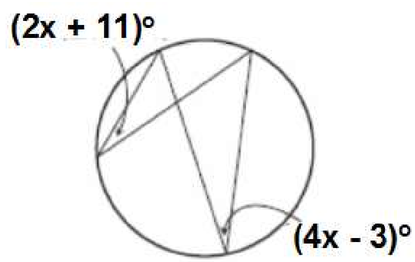
Example 3 – Inscribed Angles that Share an Intercepted Arc

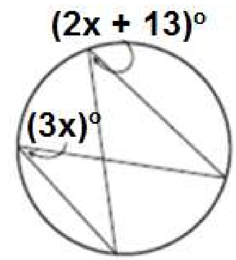
EXAMPLE 3	RULE	WORKED OUT
	If inscribed angles intercept the same arc, they are congruent. Angle = Angle	

Solve for x or find the angle requested.

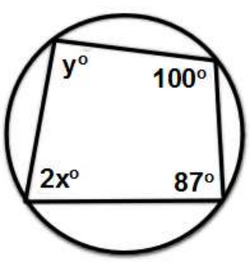
1.





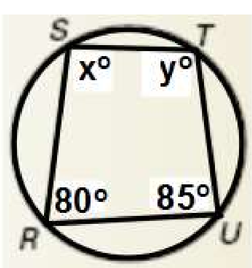


Example 4 – Inscribed Quadrilaterals

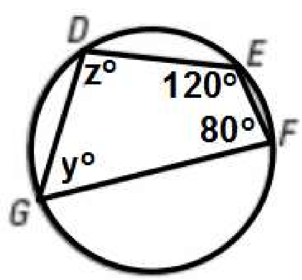
EXAMPLE 4	RULE	WORKED OUT
	When a quadrilateral is inscribed in a circle, opposite angles are supplementary (add up to 180). Opp Angle + Opp Angle = 180	

Solve for the missing variables.

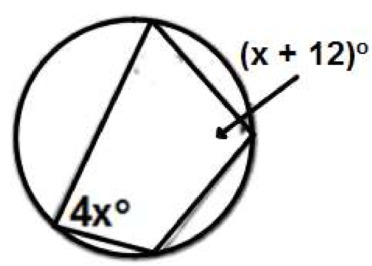
1.



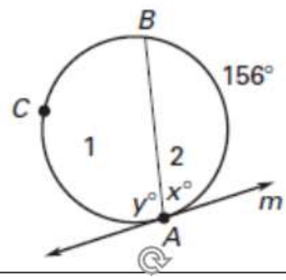
2.



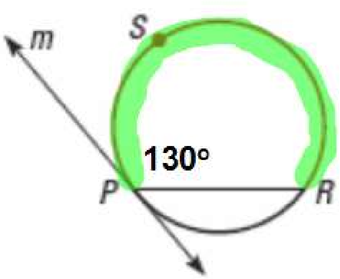
3.



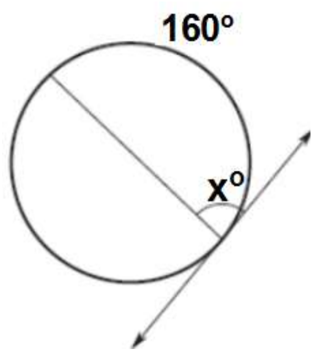
Example 5 – Intersecting Chords and Tangents

EXAMPLE 5	RULE	WORKED OUT
	If a chord and a tangent intersect on the circle, the measure of the angle is ½ the measure of the intercepted arc. Arc = 2(Angle) Angle = $\frac{\text{Arc}}{2}$	

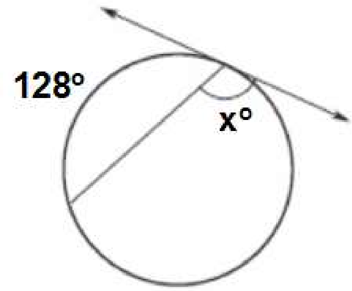
1. Find the m $\overset{\frown}{PSR}$



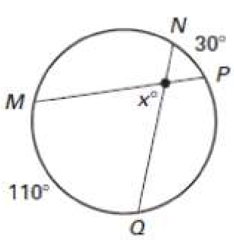
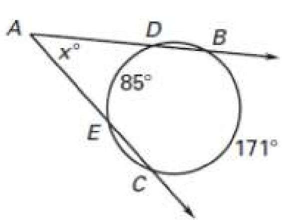
2. Solve for x.



3. What is *m∠x?*

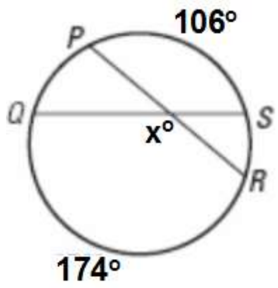


Example 6 – Interior and Exterior Angles

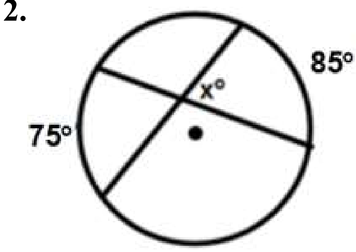
EXAMPLE 6	RULE	WORKED OUT
	If 2 chords intersect inside a circle, then the measure of each angle is ½ the sum of the measures of the arcs intercepted by the angle and its vertical angle. $\frac{\text{Arc} + \text{Arc}}{2}$ = Inside Angle	
	If a tangent and a secant, 2 tangents, or 2 secants intersect in the exterior of a circle, the measure of the angle formed is ½ the difference of the measures of the intercepted arcs. $\frac{\text{Big Arc} - \text{Little Arc}}{2}$ = Ext Angle	

Solve for x:

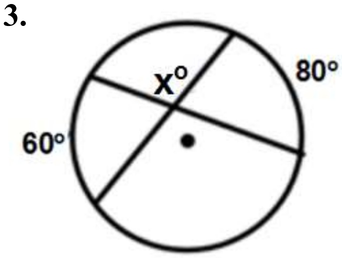
1.



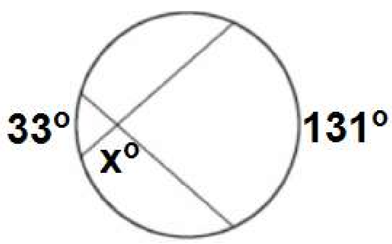
2.



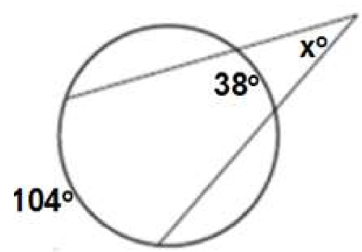
3.



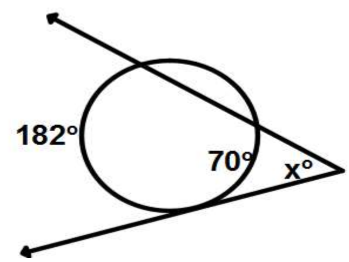
4.



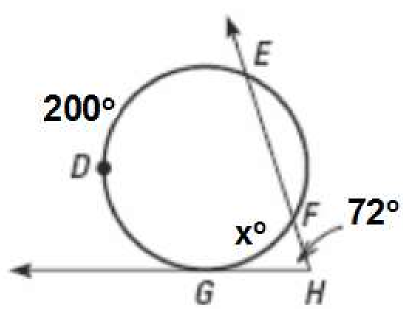
5.



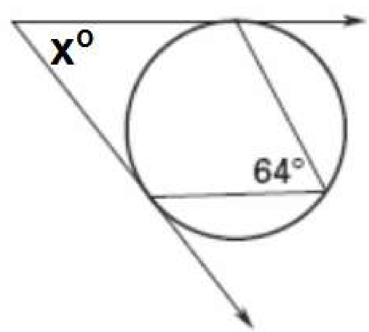
6.



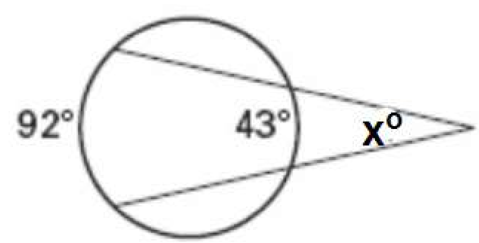
7.



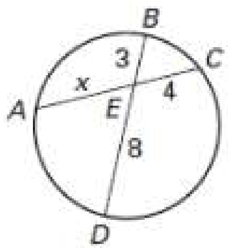
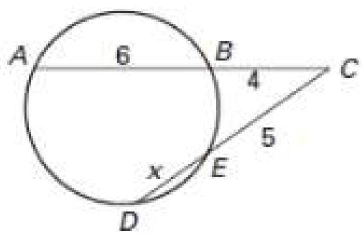
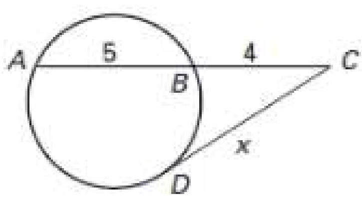
8.



9.

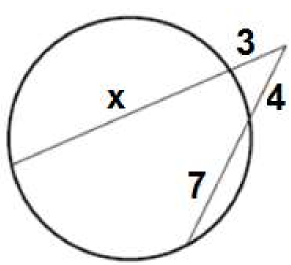


Example 7 – Segments formed by chords, secants, and tangents

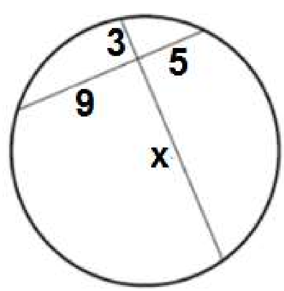
EXAMPLE 7	RULE	WORKED OUT
	If 2 chords intersect in the interior of a circle then the product of each chord is congruent to the other. Chord 1 Chord 2 Part · Part = Part · Part	
	2 secant segments share the same exterior endpoint, then the product of the length of 1 secant segment and the length of its external segment = the product of the length of the other secant segment and the length of its external segment. Secant 1 Secant 2 Outside(whole) = Outside(whole)	
	A secant segment and a tangent segment share an exterior endpoint, then the product of the length of the secant segment & its external segment equals the square of the tangent segment length. Secant Tangent Outside(whole) = Outside(Outside)	

Solve for x.

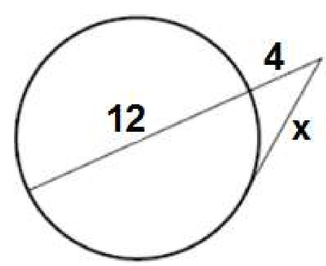
1.



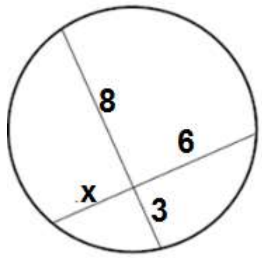
2.



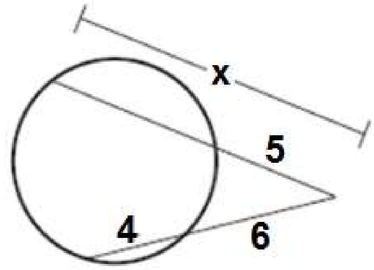
3.



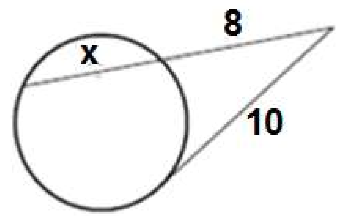
4.



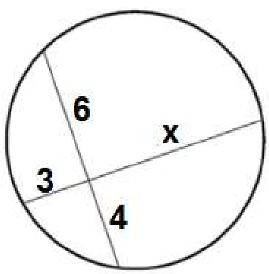
5



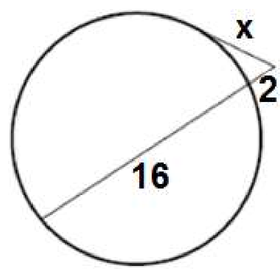
6.



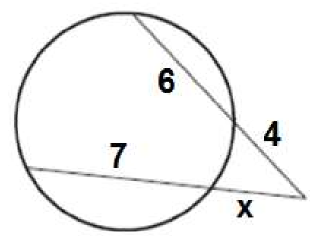
7.



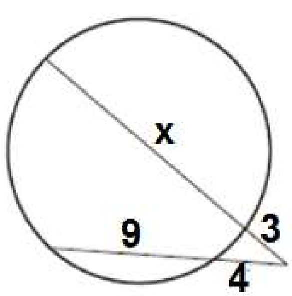
8.



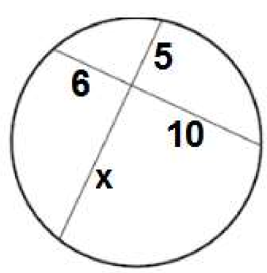
9.



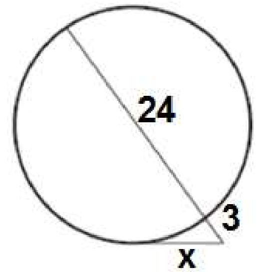
10.



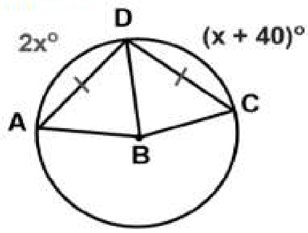
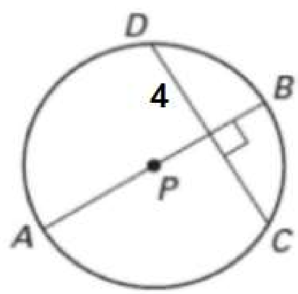
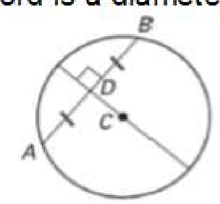
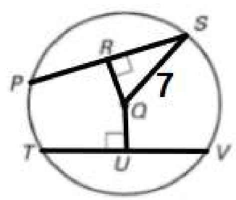
11.



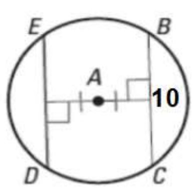
12.



Example 8 – Chord Properties

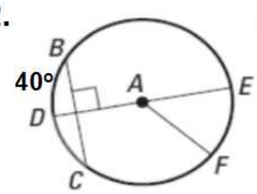
EXAMPLE 8	RULE	WORKED OUT
Find m $\overset{\frown}{AD}$. 	**Congruent Chord and Arc** In the same circle, or in congruent circles, 2 minor arcs are congruent if and only if their corresponding chords are congruent.	
EX. 1: DC = _____ 	**Diameters and Chords** * If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord and its arc. * If one chord is a perpendicular bisector of another chord, then the first chord is a diameter. 	
EX. 1: PS = 12 TV = 12 SQ = 7 Find QU. 	**Congruent Chords** In the same circle, or in congruent circles, 2 chords are congruent if and only if they are equidistant from the center.	

1.



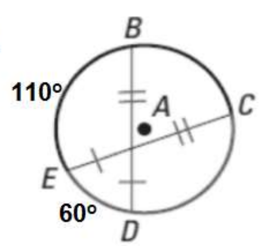
m $\overline{ED}$ = ____

2.



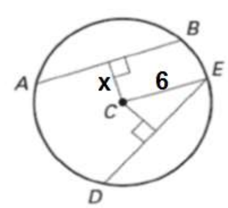
m $\overset{\frown}{DC}$ = ____

3.



m $\overset{\frown}{EDC}$ = ____

4. AB = DE = 10
radius = 6
Find x.



5. QV = 2
QU = 2
SU = 3
Find x.