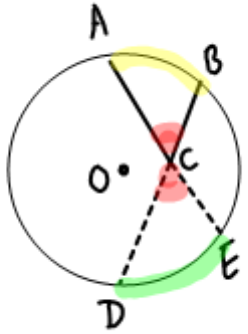
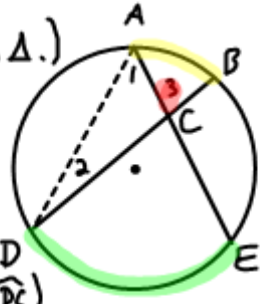
Vertex Location: INSIDE the circle (but not at center)



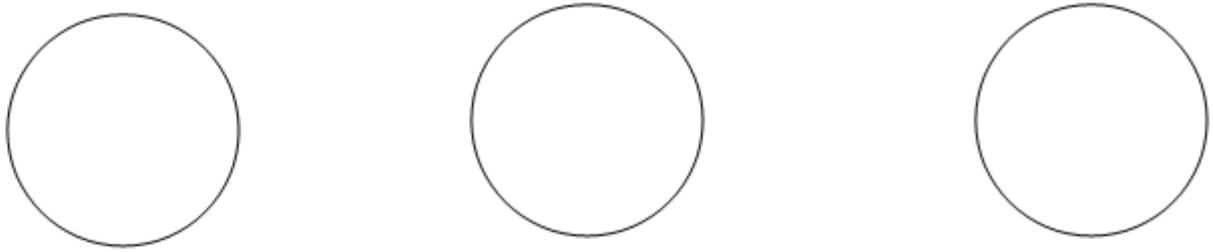
↗ chord-chord ∠

Formula: $m\angle ACB = \frac{1}{2}(m\overset{\frown}{AB} + m\overset{\frown}{DE})$
(or $\angle DCE$)

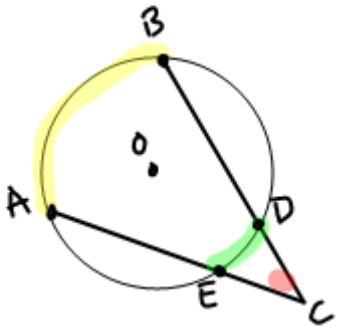


Pf: $\angle ACB = \angle 3 = \angle 1 + \angle 2$ (Ext. ∠ in Δ.)
$\angle 1 = \frac{1}{2} m\overset{\frown}{DE}$ and $\angle 2 = \frac{1}{2} m\overset{\frown}{AB}$.
By substitution,
$\angle ACB = \frac{1}{2} m\overset{\frown}{AB} + \frac{1}{2} m\overset{\frown}{DC} = \frac{1}{2}(m\overset{\frown}{AB} + m\overset{\frown}{DC})$.

Vertex Location: OUTSIDE the circle

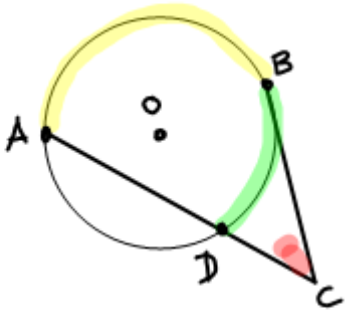


Vertex Location: OUTSIDE the circle



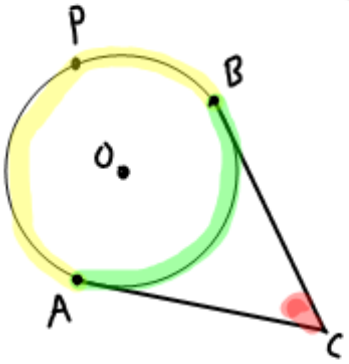
Secant-Secant ∠

$m\angle C = \frac{1}{2}(m\overset{\frown}{AB} - m\overset{\frown}{DE})$



Tangent-Secant ∠

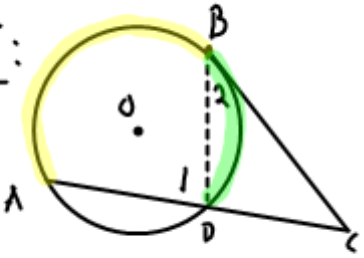
$m\angle C = \frac{1}{2}(m\overset{\frown}{AB} - m\overset{\frown}{BD})$



Tangent-Tangent ∠

$m\angle C = \frac{1}{2}(m\overset{\frown}{APB} - m\overset{\frown}{AB})$

Pf:



$\angle 1 = \angle 2 + \angle C$ (Ext. ∠ in △)

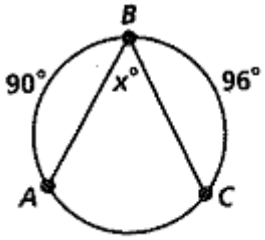
$\therefore \angle C = \angle 1 - \angle 2$

$= \frac{1}{2}m\overset{\frown}{AB} - \frac{1}{2}m\overset{\frown}{BD}$

$= \frac{1}{2}(m\overset{\frown}{AB} - m\overset{\frown}{BD})$.

Where is the vertex? Find the value of each variable.

1.



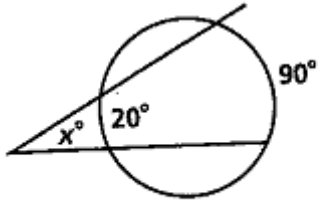
ON

$360 - 90 - 96 = 174$

$x = \frac{1}{2}(174)$

$= 87$

2.



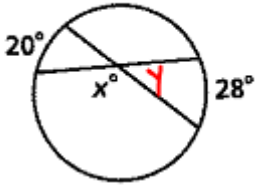
OUT

$x = \frac{1}{2}(90 - 20)$

$= \frac{1}{2}(70)$

$= 35$

3.



IN

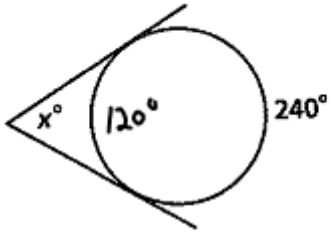
$y = \frac{1}{2}(20 + 28)$

$= \frac{1}{2}(48)$

$= 24$

So $x = 180 - 24 = 156$

4.



OUT

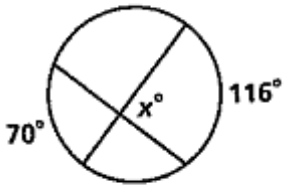
$360 - 240 = 120$

$x = \frac{1}{2}(240 - 120)$

$= \frac{1}{2}(120)$

$= 60$

5.



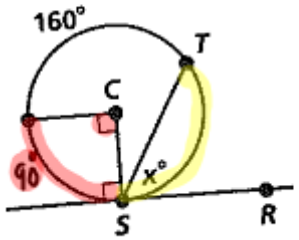
IN

$x = \frac{1}{2}(116+70)$

$= \frac{1}{2}(186)$

$= 93$

6.



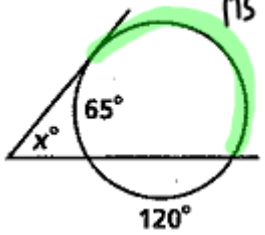
ON

$360 - 160 - 90 = 110$

So $m\overset{\frown}{TS} = 110$

$x = \frac{1}{2}(110) = 55$

7.



OUT

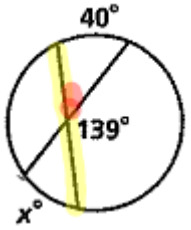
$360 - 120 - 65$

$= 175$

$x = \frac{1}{2}(175-65)$

$= \frac{1}{2}(110) = 55$

8.



IN

$180 - 139 = 41$

$2 \cdot 41 = \frac{1}{2}(40+x)$

$82 = 40+x$

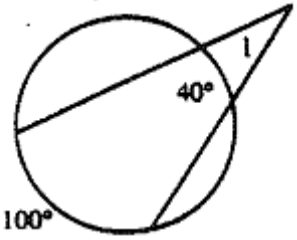
$-40 \quad -40$

$42 = x$

Find the measure of each indicated arc or angle. When point *O* is shown, it is the center of the circle. You may assume that segments that look like tangents are tangents.

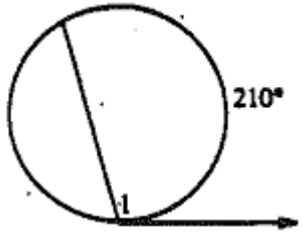
Try it!

1.



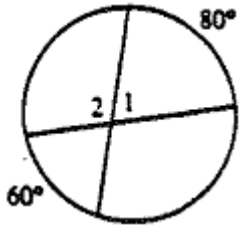
$m\angle 1 =$ 30

2.



$m\angle 1 =$ 105

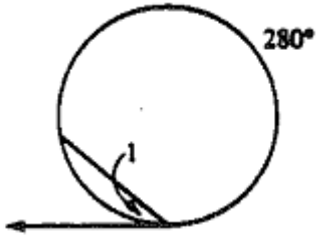
3.



$m\angle 1 =$ 70

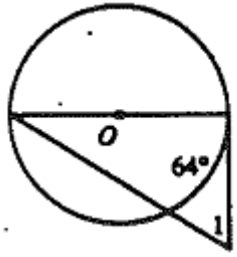
$m\angle 2 =$ 110

4.



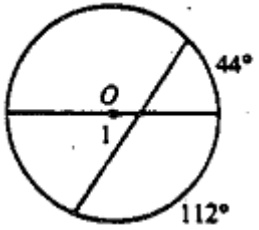
$m\angle 1 =$ 40

5.



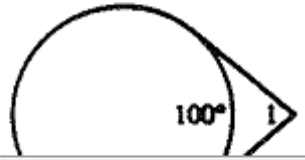
$m\angle 1 =$ 58

6.

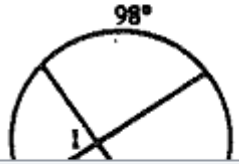


$m\angle 1 =$ 56

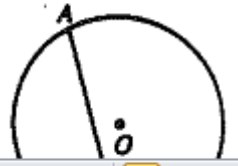
7.



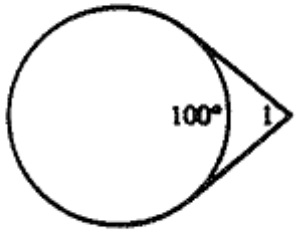
8.



9.

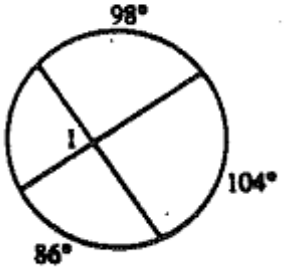


7.



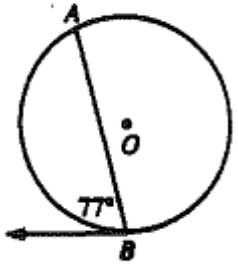
$m\angle 1 =$ 80

8.



$m\angle 1 =$ 88

9.



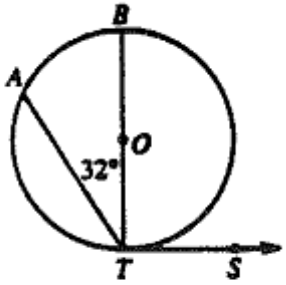
$m\widehat{AB} =$ 154

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

$77 = \frac{1}{2} m\widehat{AB}$

$154 = m\widehat{AB}$

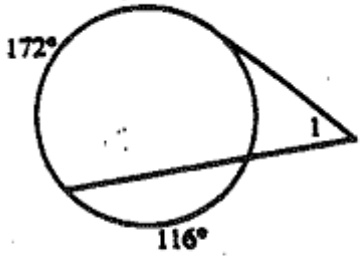
10.



$m\widehat{AB} =$ 64

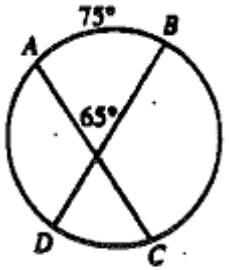
$m\angle ATS =$ 122

11.



$m\angle 1 =$ 50

12.



$m\widehat{DC} =$ 55

$65 = \frac{1}{2}(x + 75)$