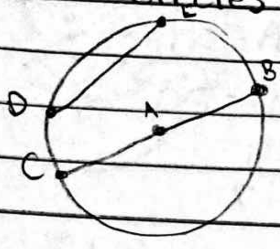
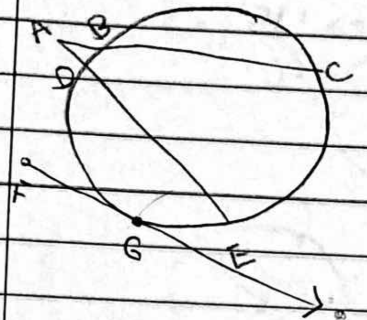
9.1: Circles + Circumfrence



AB = Radius
CB = Diameter
$R = \frac{1}{2}(D)$
$D = 2(R)$
DE = Chord - One edge to other edge

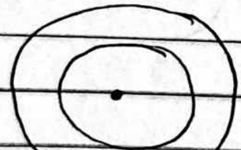


AC = Secant (Goes through 2 pts)
AF = Secant
BC = Chord
$\overleftrightarrow{FG}$ = Tangent (Intersects once)
G = Pt. of tangency

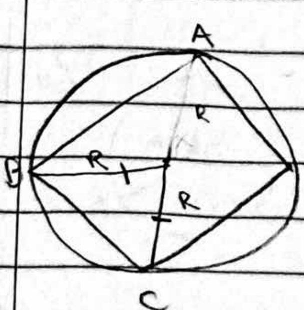
≅ Circles: Same radii

· Name ⊙ by center

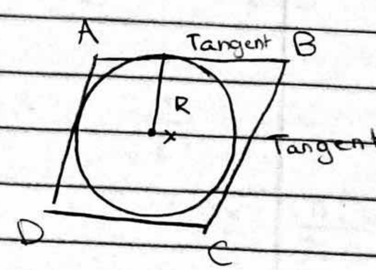
Concentric Circles: Circles within circles
- Same center



Inscribed or Circumscribed:
- Inscribed: Verticies are on circle
- Circumscribed: Verticies outside of circle

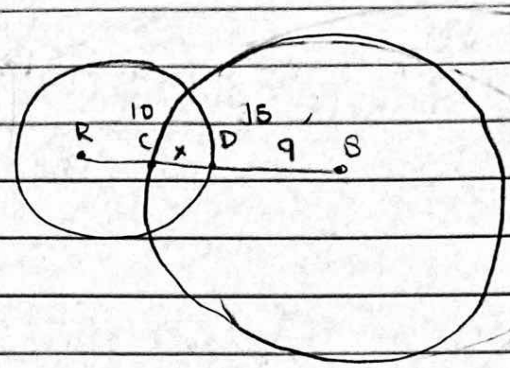


ABCD is inscribed in ⊙x.



Circumfrence (Perimenter): Distance around circle
- $C = 2\pi r$ or πD

Ex)



$\odot S$ D = 30

$\odot R$ D = 20

DS = 9

CD = ?

$9 + x = 15$

$x = 6$

Careful w/ Rounding

C of $\odot W = 106.4$

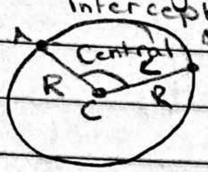
r + D = ?

$\frac{106}{2} = \frac{2\pi r}{2}$

$\frac{53}{\pi} = \frac{\pi r}{\pi}$

r = 16.934 d = 33.86

9.2: Angles and Arcs



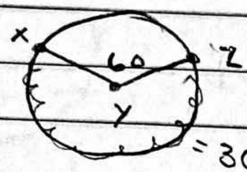
$(\overset{\frown}{AB})$

Pay attention to symbols

AB

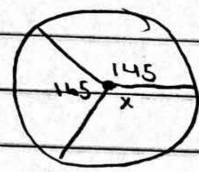
Th^m: Central Angle = Intercepted Arc

Ex)



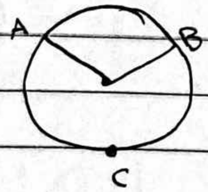
Find $\overset{\frown}{XZ} = 60°$

Ex)



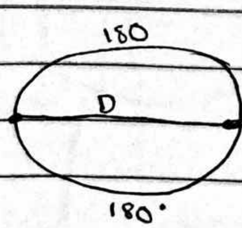
x = 50

Distance vs. Measure



Find $\overset{\frown}{AB}$ - Minor

$\overset{\frown}{ACB}$ - Major

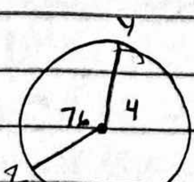


Arc Length: Distance of an arc

- is a fraction of entire circle (Circumfrence)

☆ • $\frac{\text{Length of Arc}}{\text{Circumfrence}} = \frac{\text{Measure of Arc}}{360}$

Ex)



Length of $\overset{\frown}{ZY}$

$\frac{76}{360}(2\pi r)$ $\qquad \frac{x}{2\cancel{8}\pi} = \frac{76}{360}$

$\frac{76}{360}(2\pi 4)$ $\qquad \frac{360x}{360} = \frac{8\pi(76)}{360}$

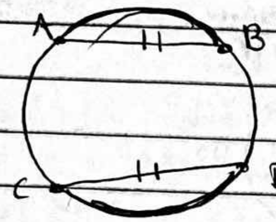
$\frac{76}{360}(8\pi)$ $\qquad x =$

$\overset{\frown}{ZY} = 5.3058$ or 1.688π

9.3: Arc/Chords

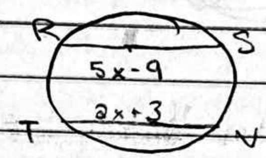
Th^m: 2 minor arcs are congruent if their corresponding chords are $\cong$.
- 2 chords are $\cong$, if their corresponding minor arcs are $\cong$

Ex)

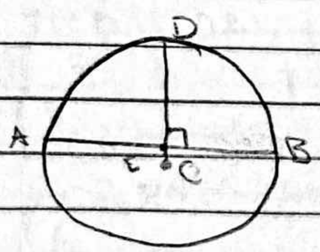


Since $\overline{AB}$ is $\cong \overline{CD}$
then $\overset{\frown}{AB}$ is $\cong \overset{\frown}{CD}$

g: $\overset{\frown}{RS} \cong \overset{\frown}{TV}$



Th^m: If a diameter (radius) of a circle is $\perp$ to a chord, then it bisects the chord and its arc

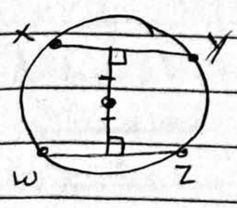


Since the radius is $\perp$ to $\overline{AB}$ then E is a midpoint, $\overline{AE} \cong \overline{EB}$, $\overset{\frown}{AD} \cong \overset{\frown}{BD}$

RTL + Midpt

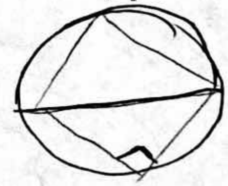
Th^m: A $\perp$ bisector of a chord is the Diameter of a circle

Th^m: 2 chords are $\cong$ if they are equidistant from the center.

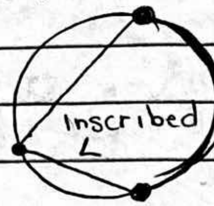


$\Rightarrow$ Since the chords are equidistant from center, they are $\cong$

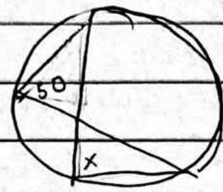
18



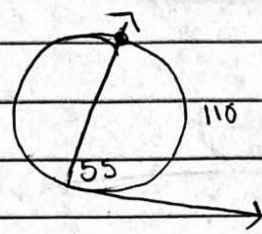
9.4: Incribed ∠'s



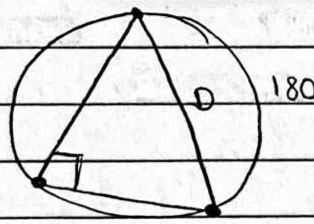
Thm: Incribed ∠ = ½(Intercepted Arc)



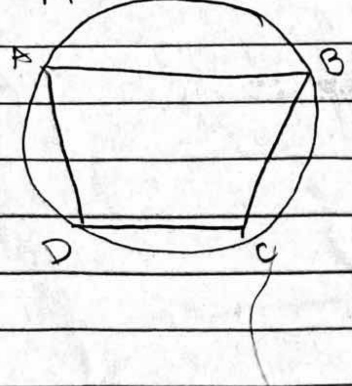
X=50



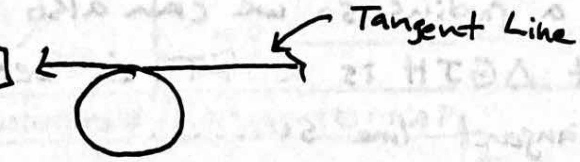
Thm: An inscribed ∠ of a △ intercepts the Diameter if its a RT ∠

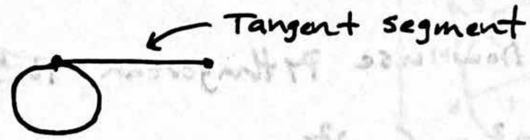


Thm: If a quadrilateral is inscribed in a circle, then its opposite ∠'s are supp.

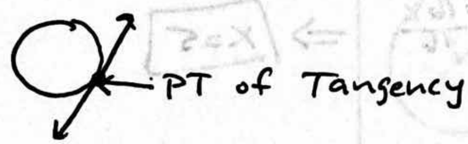


∠A supp ∠C
∠B supp ∠D

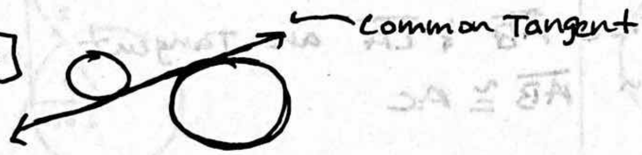
EX] 

EX] 

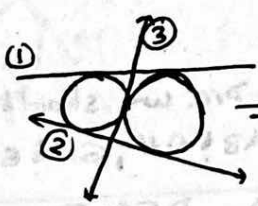
__POINT of Tangency__: PT where Touches Circle

EX] 

__Common TangenT__: One Tangent line for 2 circles.

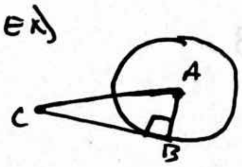
EX] 

* There CAn be more than 1 common Tangent. *

EX] 

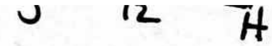
$\Longrightarrow$ There are 3 Common Tangents

__Th$^{\underline{m}}$__: IF a Line IS Tangent To a Circle, then it IS $\perp$ To the radius. (You can use $a^2+b^2=c^2$ To see if an $\angle$ is a RT $\angle$)

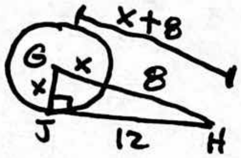
EX] 

Since $\overline{CB}$ IS a Tangent, $\angle B$ IS a RT $\angle$ which will give us a RT $\triangle ABC$. And we Know how To Find missing Parts of RT $\triangle$'s.

OVER



- We know that $\overline{GK}$ is a radius so we can also call that "x". We also know that $\triangle GJH$ is a RT $\triangle$ because a radius is $\perp$ To a Tangent line so.....



we can now use Pythagorean Th^m To solve:

$$x^2 + 12^2 = (x+8)^2$$

use FoiL

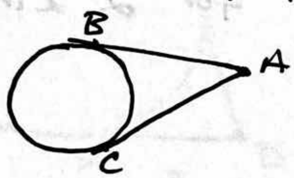
$$x^2 + 144 = x^2 + 16x + 64$$

$$144 = 16x + 64$$

$$\frac{80}{16} = \frac{16x}{16} \Rightarrow \boxed{x = 5}$$

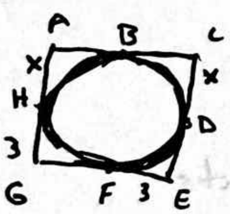
Th$^{\underline{m}}$: If 2 segments from the Same Ext. PT are Tangent To a circle, then they are $\cong$.

Ex)



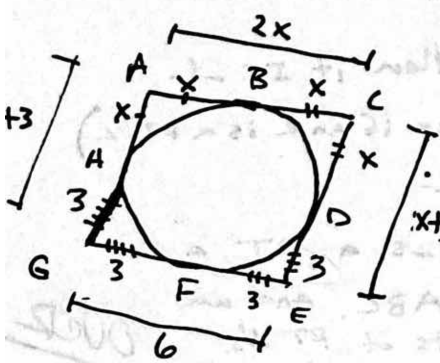
Since $\overline{AB}$ & $\overline{CA}$ are Tangent then $\overline{AB} \cong AC$

Ex] Walk around Problem: (This will be on a Test)



Perimeter = 18, Find x.

If we look carefully @ this Pic. we should see a lot of Tangent lines, i.e. CB & CD, AB & AH, GH & GF, FE & ED. which means: $AB \cong AH$, $CB \cong CD$, $DE \cong FE$, $GF \cong GH$ Thus we could walk around the Problem To Find lengths.



$$\Rightarrow \text{So } 2x + x + 3 + 6 + x + 3 = 18$$

$$4x + 12 = 18$$

$$4x = 6$$

$$x = \frac{6}{4} = \frac{3}{2}$$

Sec 9.6 - KNOW your concepts & $Th^{m}s$.

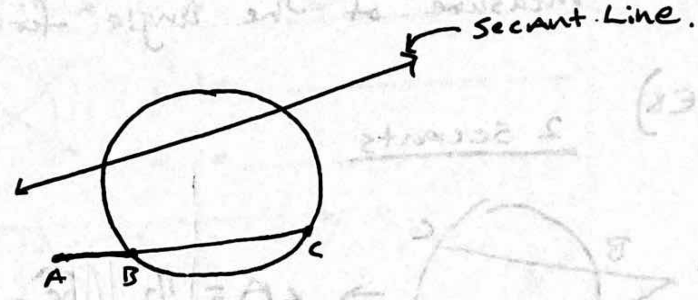
Secant/Tangent angles

Secant: line that intersects a circle @ 2 pts.

Secant seg: $\overline{AC}$ in the picture

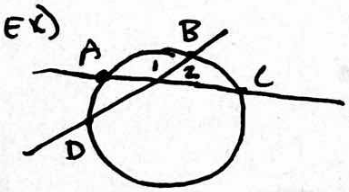
External secant segment: $\overline{AB}$

Chord: BC in the picture



$Th^{\underline{m}}$: If 2 secants or 2 chords intersect in the interior of a circle, then the angle formed is $\frac{1}{2}$(sum of its intercepted arcs)

Ex)



$\Longrightarrow$ $\angle 1 = \frac{1}{2}(\overset{\frown}{AB} + \overset{\frown}{CD})$

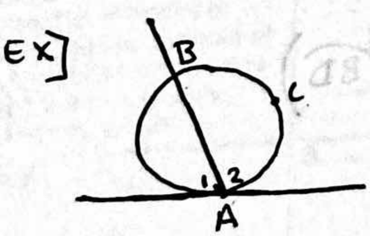
$\angle 2 = \frac{1}{2}(\overset{\frown}{BC} + \overset{\frown}{AD})$

See Example 1 in Book page 728

$Th^{\underline{m}}$: If a secant and a tangent intersect @ the PT of tangency then the angle formed is $\frac{1}{2}$(intercepted arc)

* The angle formed is an inscribed angle.

Ex]



$\Longrightarrow$ $\angle 1 = \frac{1}{2}(\overset{\frown}{AB})$

$\angle 2 = \frac{1}{2}(\overset{\frown}{ACB})$

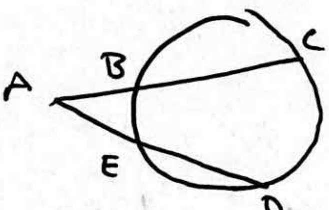
See Example 2 on page 729

over.

Th^{m}: If 2 secants, a secant and a Tangent or 2 Tangents intersect in the Exterior of a circle, then the Measure of the angle formed = 1/2 (Difference of Intercepted arcs)

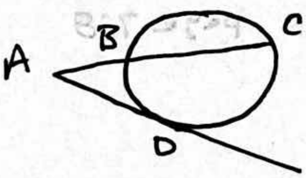
Ex)

2 Secants



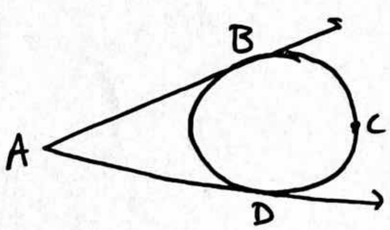
$\Rightarrow \angle A = \frac{1}{2}(\overset{\frown}{DC} - \overset{\frown}{BE})$

Secant & Tangent



$\Longrightarrow \angle A = \frac{1}{2}(\overset{\frown}{DC} - \overset{\frown}{BD})$

2 Tangents



$\Rightarrow \angle A = \frac{1}{2}(\overset{\frown}{DCB} - \overset{\frown}{BD})$

* See Example 3 Page 730