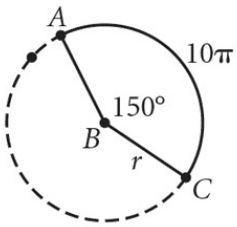
LESSON 9.6

Arc Length

Warm-Up

Find the radius.



$\text{Arc Length} = \frac{m}{360} \cdot 2\pi r$

$10\pi = \frac{150}{360} \cdot 2\pi r$

$12 \cdot 10 = \frac{5}{12} \cdot 2r \cdot 12$

$120 = 10r$

$12 = r$

LESSON 9.6

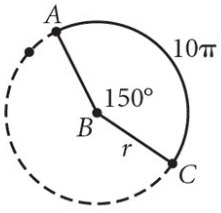
Arc Length

Extra Example

ANSWER

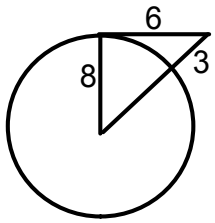
Find the radius.

$r = 12$

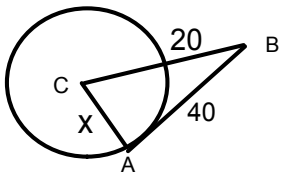


Warm-Up

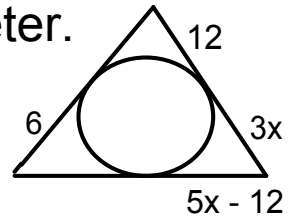
1. Determine if the segment is tangent to the circle. Explain why or why not.



2. Find x if AB is tangent.



3. Find x and the perimeter.



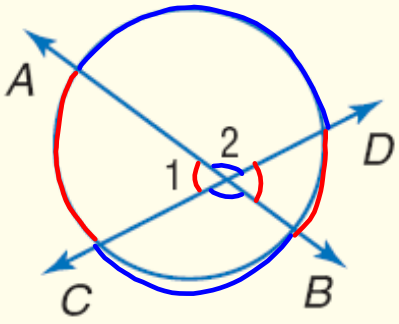
Homework:

What questions do you have?

Secants, Tangents, and Angle Measures..OH MY

Secant - line that intersects a circle at 2 points

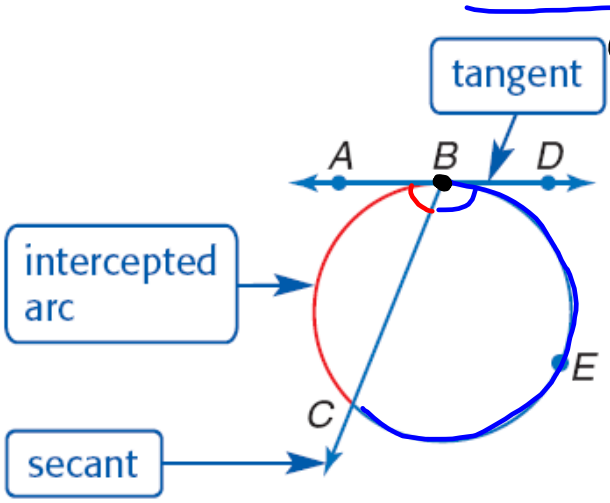
If you have 2 secants in a circle.....



$$m\angle 1 = \frac{1}{2}(m\overset{\frown}{AC} + m\overset{\frown}{BD})$$

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

If a secant intercepts a circle at the point of tangency....

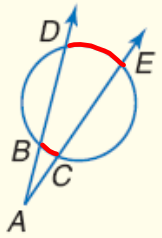
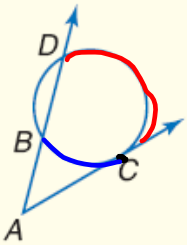
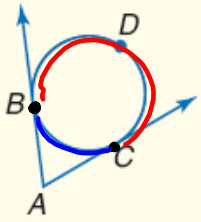


$$m\angle ABC = \frac{1}{2}m\overset{\frown}{BC}$$

and

$$m\angle DBC = \frac{1}{2}m\overset{\frown}{BEC}$$

INTERSECTIONS OUTSIDE A CIRCLE

Two Secants	Secant-Tangent	Two Tangents
		
$m\angle A = \frac{1}{2}(m\overset{\frown}{DE} - m\overset{\frown}{BC})$	$m\angle A = \frac{1}{2}(m\overset{\frown}{DC} - m\overset{\frown}{BC})$	$m\angle A = \frac{1}{2}(m\overset{\frown}{BDC} - m\overset{\frown}{BC})$

If the angle is outside the circle.... use subtraction

Summary: The key is the location of the vertex!!!

If the vertex is **inside** the circle, it's measure is...

half the sum of the measures of the intercepted arcs.

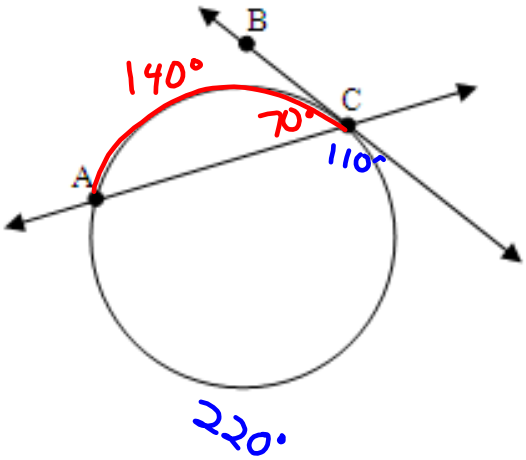
If the vertex is **on** the circle, it's measure is...

half the measure of the intercepted arc.

If the vertex is **outside** the circle, it's measure is...

half the difference of the measures of the intercepted arcs.

1) The $m\overset{\frown}{AC} = 140°$ Find the $m\angle BCA$.



Summary: **The key is the location of the vertex!!!**

If the vertex is **inside** the circle, it's measure is...

half the sum of the measures of the intercepted arcs.

If the vertex is **on** the circle, it's measure is...

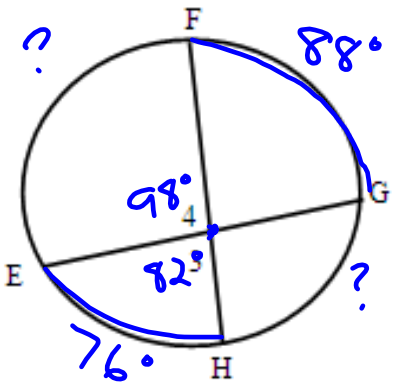
half the measure of the intercepted arc.

If the vertex is **outside** the circle, it's measure is...

half the difference of the measures of the intercepted arcs.

Example 2

Find $m\angle 4$, if $m\overset{\frown}{FG} = 88°$, $m\overset{\frown}{EH} = 76°$.



IN the circle

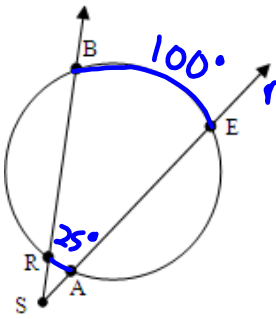
$\frac{1}{2}(m\overset{\frown}{EH} + m\overset{\frown}{FG})$

$\frac{1}{2}(76+88)$

82°

Two secants

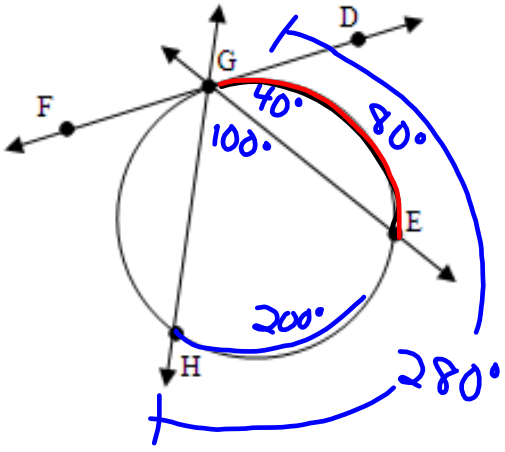
3) Find m∠S, if $\overset{\frown}{mBE} = 100°$ and $\overset{\frown}{mAR} = 25°$.



$m\angle S = \frac{1}{2}(100-25)$

$m\angle S = 37.5°$

4) $\overline{FD}$ is tangent to the circle at G, $m\overset{\frown}{HEG}=280°$ and $m\angle HGE=100°$.
Find the $m\angle DGE$.



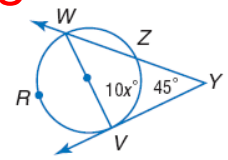
A secant and a tangent

Find x.

$\overset{\frown}{WRV}$ is a semicircle because $\overline{WV}$ is a diameter.

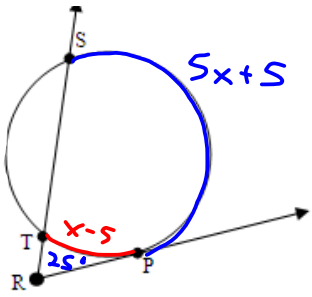
So, $m\overset{\frown}{WRV} = 180$.

$m\angle Y = \frac{1}{2}(m\overset{\frown}{WV} - m\overset{\frown}{ZV})$



$45 = \frac{1}{2}(180 - 10x)$		Substitution
$90 = 180 - 10x$		Multiply each side by 2.
$-90 = -10x$		Subtract 180 from each side.
$9 = x$		Divide each side by -10.

5) Find x, if $m\overset{\frown}{PT}=(x-5)°$ $m\overset{\frown}{PS}=(5x+5)°$ and m ∠R = 25



Outside → subtract

$25 = \frac{1}{2}(5x+5-(x-5))$

$50 = 5x+5-(x-5)$

$50 = 5x+5-x+5$

$50 = 4x+10$

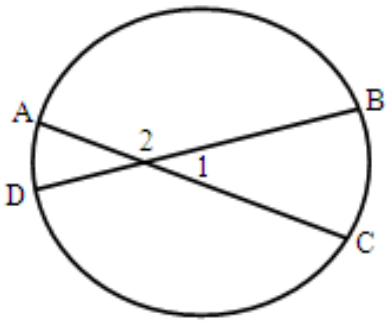
$40 = 4x$

$10 = x$

6) If $m\angle 1 = 25°$ and $m\overset{\frown}{AD} = 20°$, find $m\overset{\frown}{BC}$ and $m\angle 2$.

$m\overset{\frown}{BC} = 25°$

$m\angle 2 = 155°$



Two tangents

$11 = \frac{1}{2}(360 - x - x)$

$11 = \frac{1}{2}(360 - 2x)$

$22 = 360 - 2x$

$-338 = -2x$ $\quad x = 169°$

7)

Tangent-Tangent Angle

SATELLITES Suppose a geostationary satellite S orbits about 35,000 kilometers above Earth rotating so that it appears to hover directly over the equator. Use the figure to determine the arc measure on the equator visible to this geostationary satellite.

360 - x

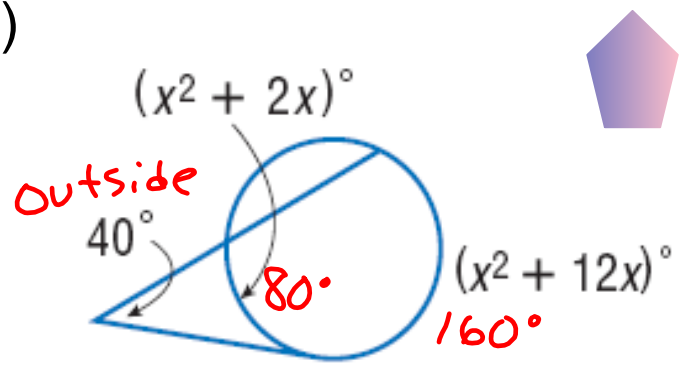
$\overset{\frown}{PR}$ represents the arc along the equator visible to the satellite S. If $x = m\overset{\frown}{PR}$, then $m\overset{\frown}{PQR} = 360 - x$. Use the measure of the given angle to find $m\overset{\frown}{PR}$.

$m\angle S = \frac{1}{2}(m\overset{\frown}{PQR} - m\overset{\frown}{PR})$

$11 = \frac{1}{2}[(360 - x) - x]$	Substitution
$22 = 360 - 2x$	Multiply each side by 2 and simplify.
$-338 = -2x$	Subtract 360 from each side.
$169 = x$	Divide each side by -2.

The measure of the arc on Earth visible to the satellite is 169.

8)



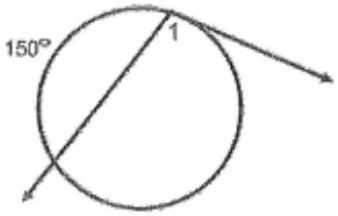
$80 = x^2 + 12x - (x^2 + 2x)$

$80 = x^2 + 12x - x^2 - 2x$

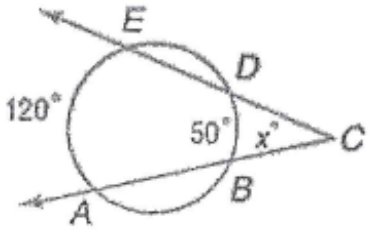
$80 = 10x$

$8 = x$

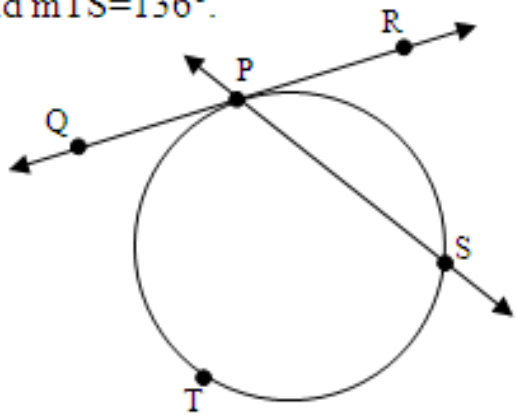
9. Find $m\angle 1$.



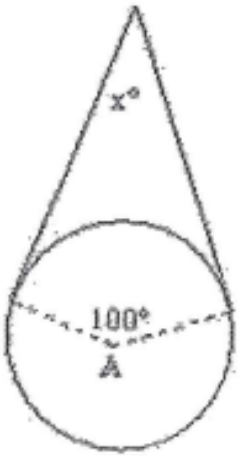
10. Find x.



11) Find $m\angle RPS$, if $m\overset{\frown}{PT}=114°$ and $m\overset{\frown}{TS}=136°$.



12. Solve for x.



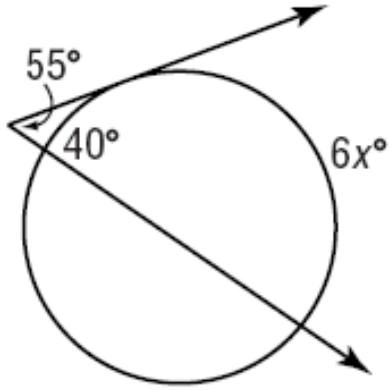
Group Practice:

Turn into your table groups and complete problems 13-18

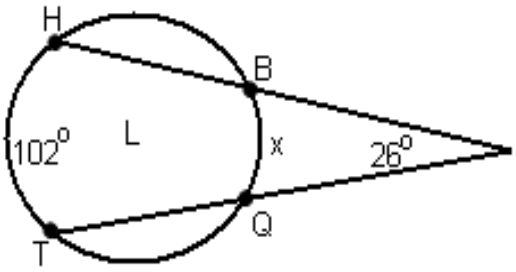
Homework:

- Finish Group Problems
- Start Chapter 9 Review

15) Find x.



17) Find x.



Ex 9: Use ⊙S to find the value of y.