Geometry Unit 9

9-7: Lengths of Segments in Circles

Warm-up

Identify the type of line, arc or angle that is made based off the picture and the notation given.

1.) $\overline{AD}$ Diameter

2.) $\overline{BE}$ Chord

3.) $\overleftrightarrow{BE}$ Secant

4.) $\overset{\frown}{BE}$ Minor Arc

5.) $\overline{OC}$ Radius

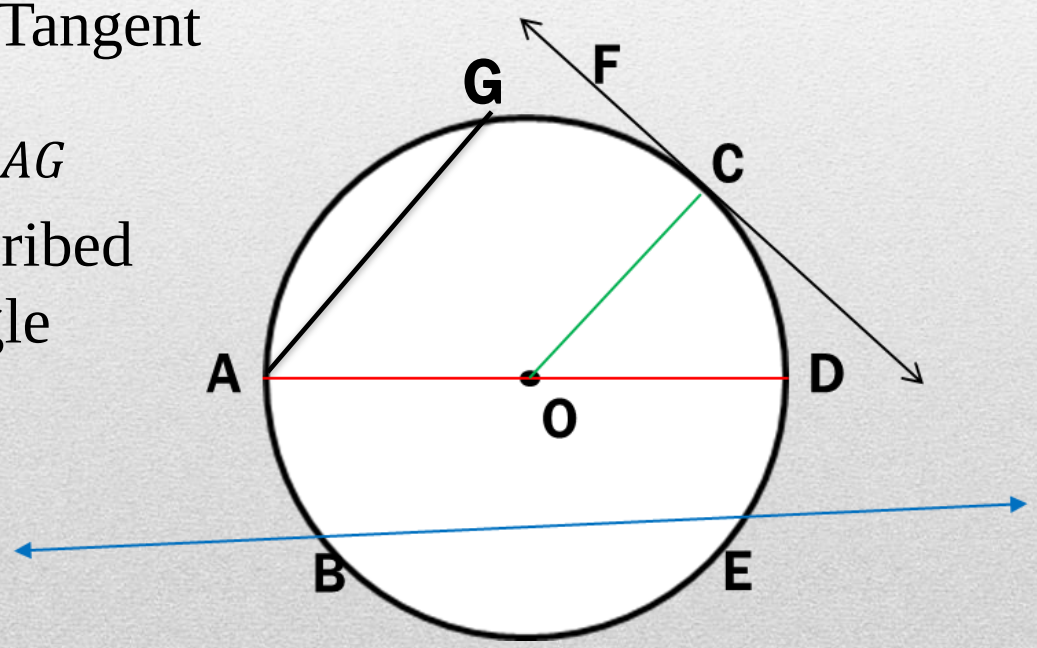
6.) $< COD$ Central Angle

7.) $\overset{\frown}{DCA}$ Semicircle

8.) $\overset{\frown}{CDA}$ Major Arc

9.) $\overleftrightarrow{FC}$ Tangent

10.) $< DAG$ Inscribed Angle



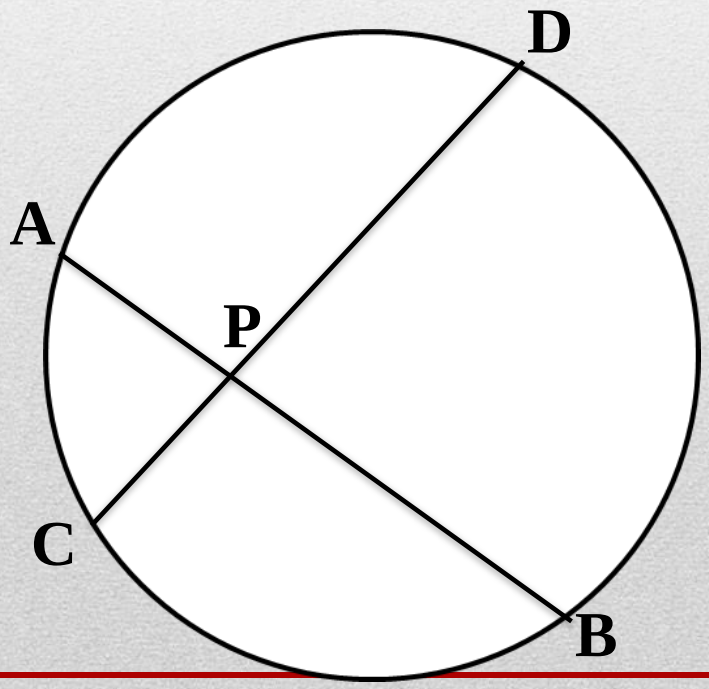
Segment Lengths in Circles

- **Content Objective**: Students will be able to identify segments created by chords, secants, and tangents inside and outside of circles.

- **Language Objective**: Students will be able to solve for the measures of segments created by chords, secants, and tangents by using equations.

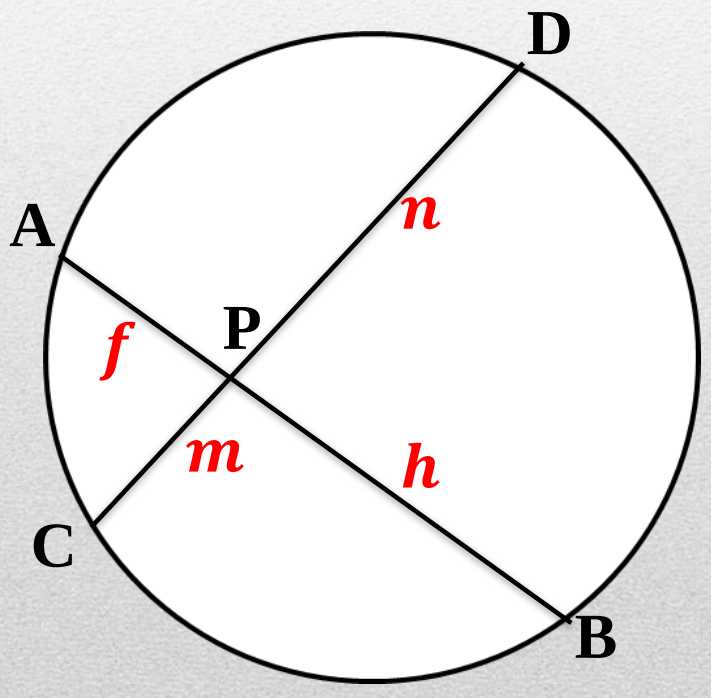
Segment Lengths in Circles

- In the figure below, you see that $\overline{AB}$ and $\overline{CD}$ intersect at P in the circle.
- We call $\overline{AP}$ and $\overline{PB}$ the ***segments of chord $\overline{AB}$.***
- Similarly, we would call $\overline{CP}$ and $\overline{PD}$ the ***segments of chord $\overline{CD}$.***



Segment Lengths in Circles

- **Theorem 9-11**: When two chords intersect inside a circle, the of product the segments of one chord equals the product of the segments of the other chord.



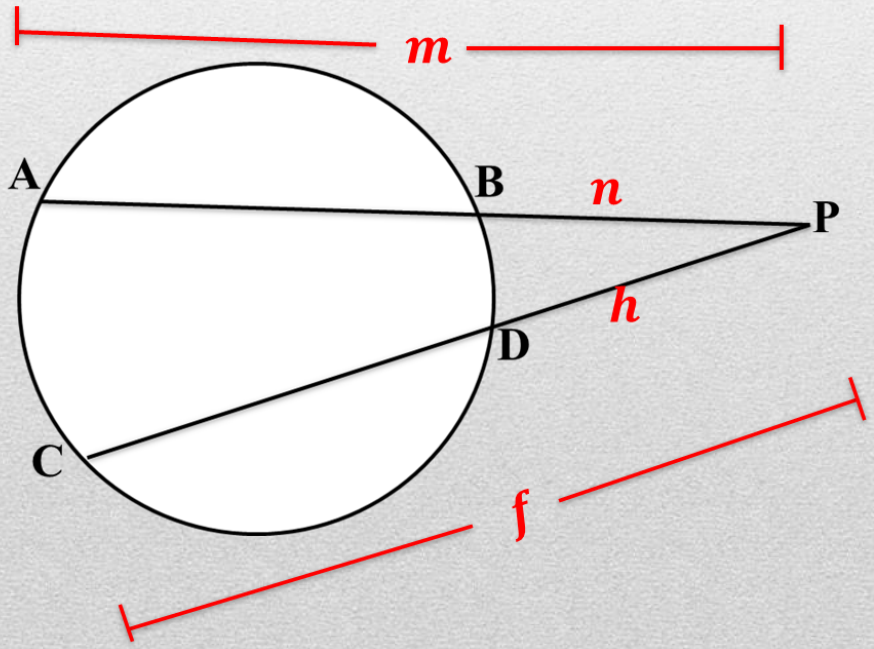
Given: $\overline{AB}$ and $\overline{CD}$ intersect at P

Then: $f \times h = m \times n$

Segment Lengths in Circles

- **Theorem 9-12**: When two secant segments are drawn to a circle from an external point,

the product of one secant segment and its external segment equals the product of the other secant segment and its external segment.



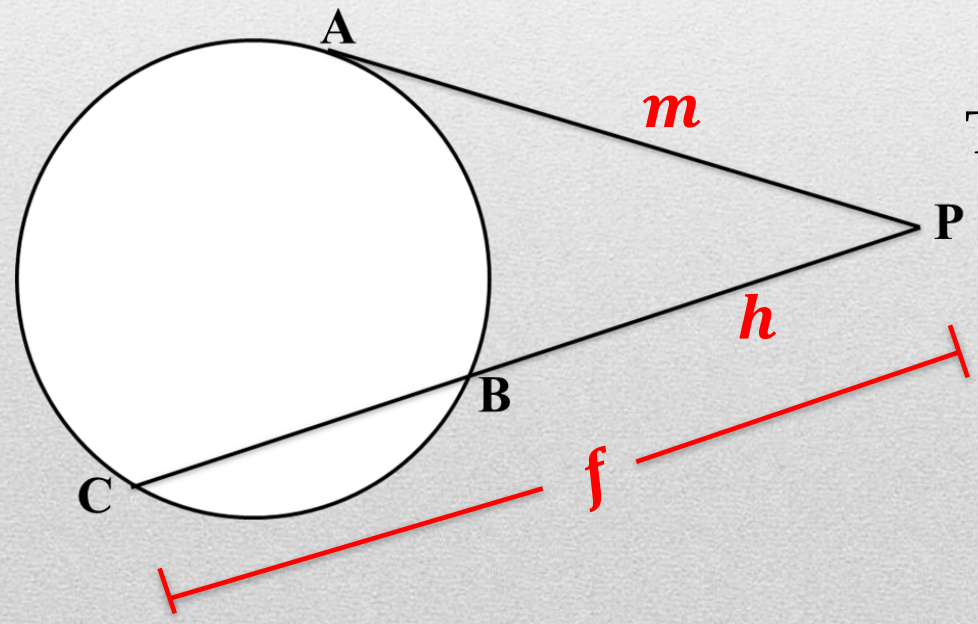
Given: $\overline{PA}$ and $\overline{PC}$ drawn from P

Then: $f \times h = m \times n$

Segment Lengths in Circles

- **Theorem 9-13**: When a secant segment and a tangent are drawn to a circle from an external point,

the product of the secant segment and its external segment is equal to the square of the tangent segment.



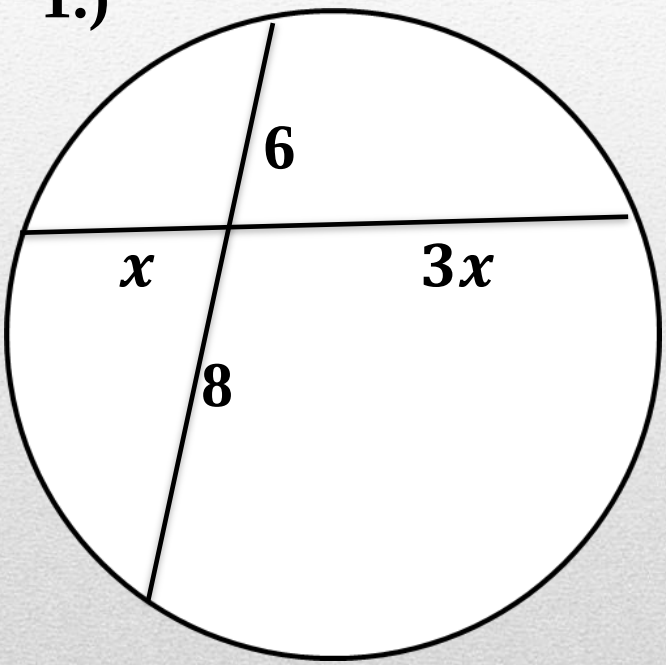
Given: $\overline{PA}$ and $\overline{PC}$ drawn from P

Then: $f \times h = m^2$

Examples

Chords, Secants, and Tangents are shown. Find the value of x.

1.)



Using **Theorem 9-1**, we have

$$x \times 3x = 6 \times 8$$

$$3x^2 = 48$$

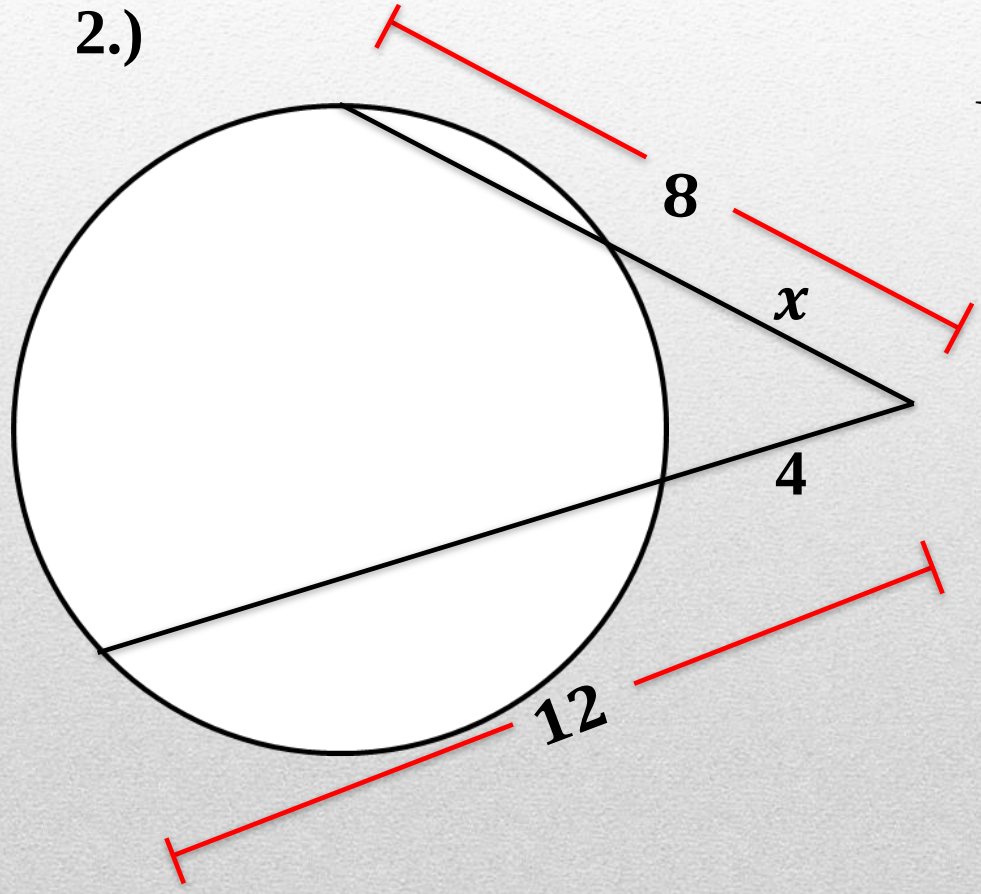
$$x^2 = 16$$

$$\boldsymbol{x = 4}$$

Examples

Chords, Secants, and Tangents are shown. Find the value of x.

2.)



Using **Theorem 9-2**, we have

$$x \times 8 = 12 \times 4$$

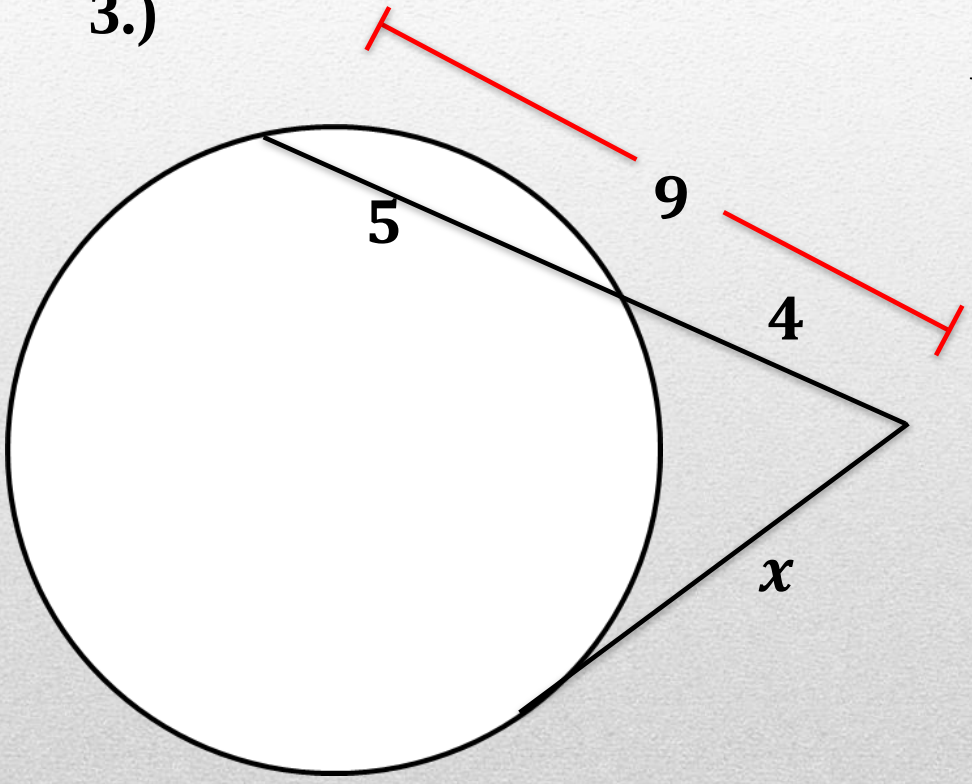
$$8x = 48$$

$$\boldsymbol{x = 6}$$

Examples

Chords, Secants, and Tangents are shown. Find the value of x.

3.)



Using **Theorem 9-3**, we have

$$x^2 = 4 \times 9$$

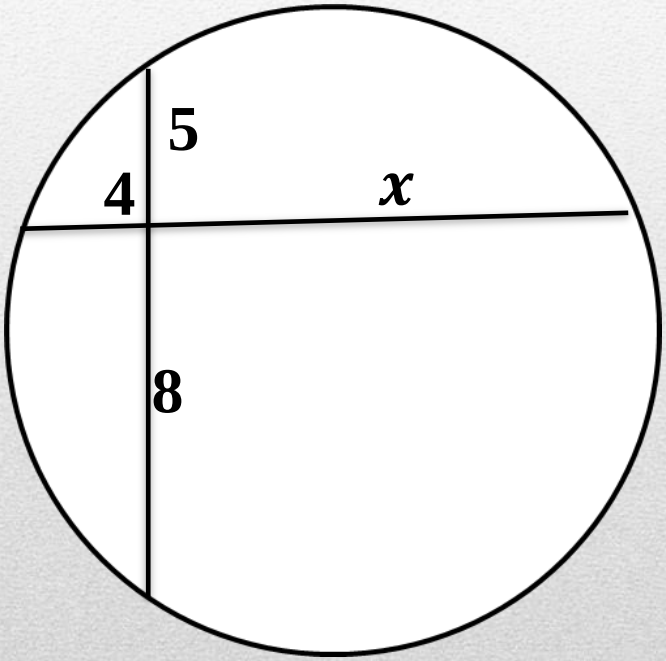
$$x^2 = 36$$

$$\boldsymbol{x = 6}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

1.)



Solution

$$x \times 4 = 5 \times 8$$

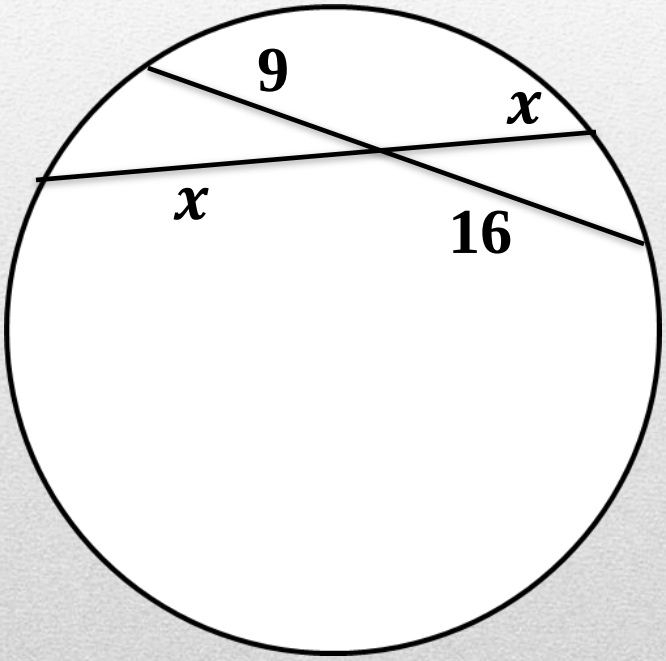
$$4x = 40$$

$$\boldsymbol{x = 10}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

2.)



Solution

$$x \times x = 9 \times 16$$

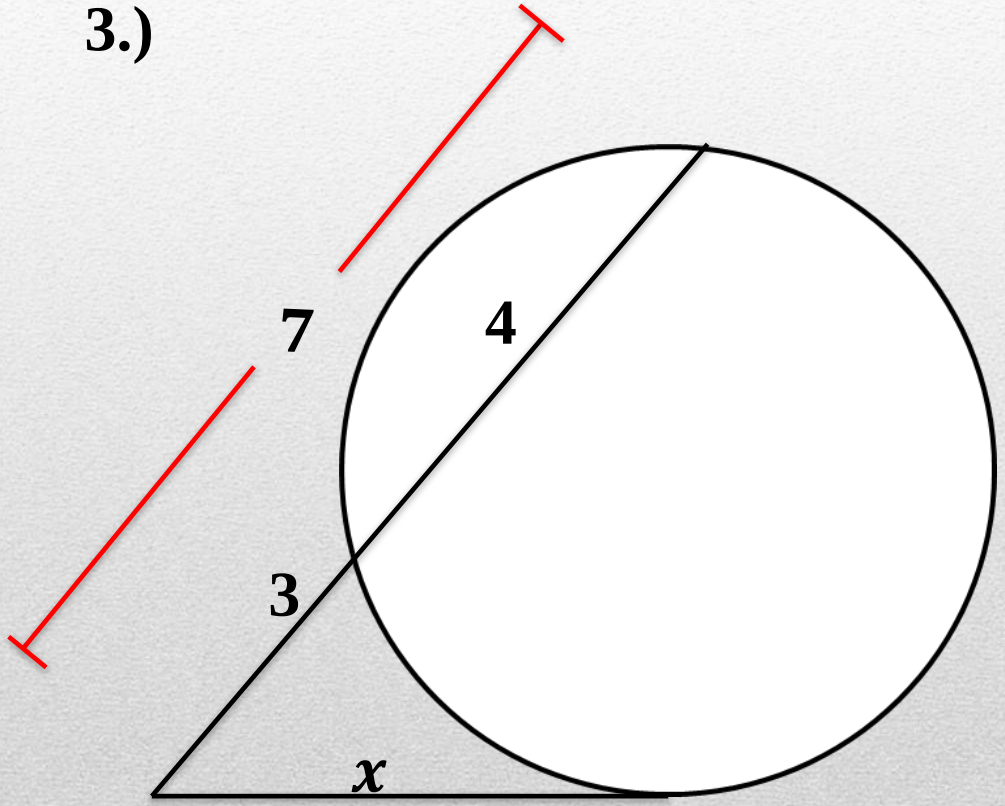
$$x^2 = 144$$

$$\boldsymbol{x = 12}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

3.)



Solution

$$x^2 = 7 \times 3$$

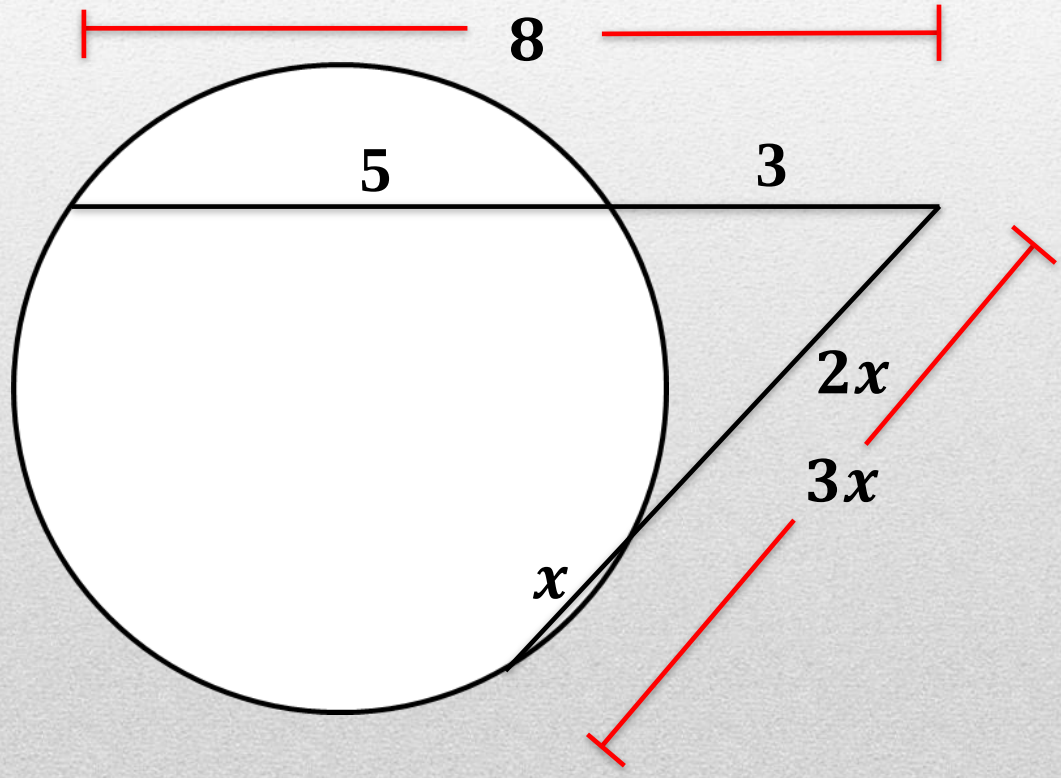
$$x^2 = 21$$

$$\boldsymbol{x = \sqrt{21}}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

4.)



Solution

$$3x \times 2x = 8 \times 3$$

$$6x^2 = 24$$

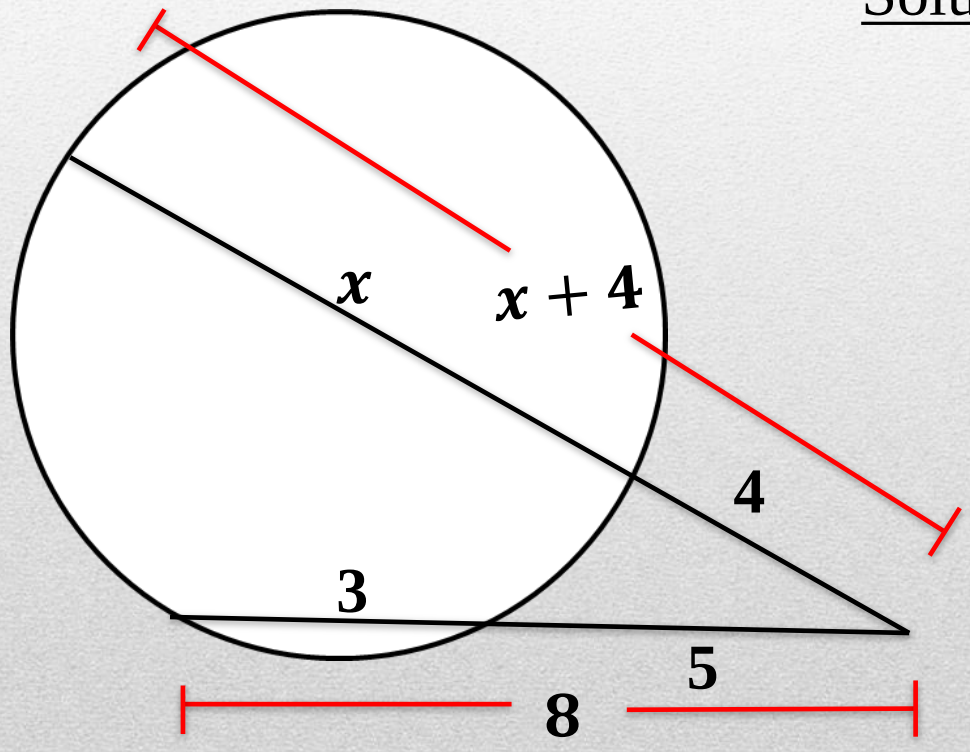
$$x^2 = 4$$

$$\boldsymbol{x = 2}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

5.)



Solution

$$(x + 4) \times 4 = 8 \times 5$$

$$4x + 16 = 40$$

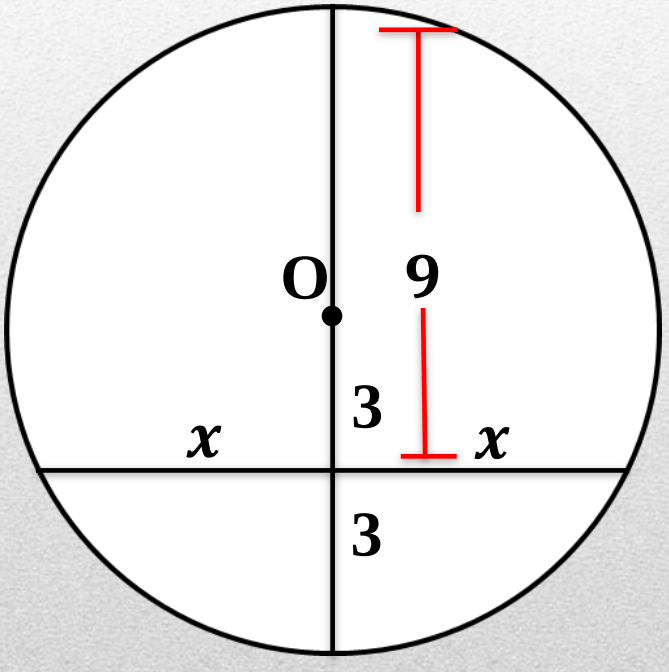
$$4x = 24$$

$$\boldsymbol{x = 6}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

6.)



Solution

$$x \times x = 9 \times 3$$

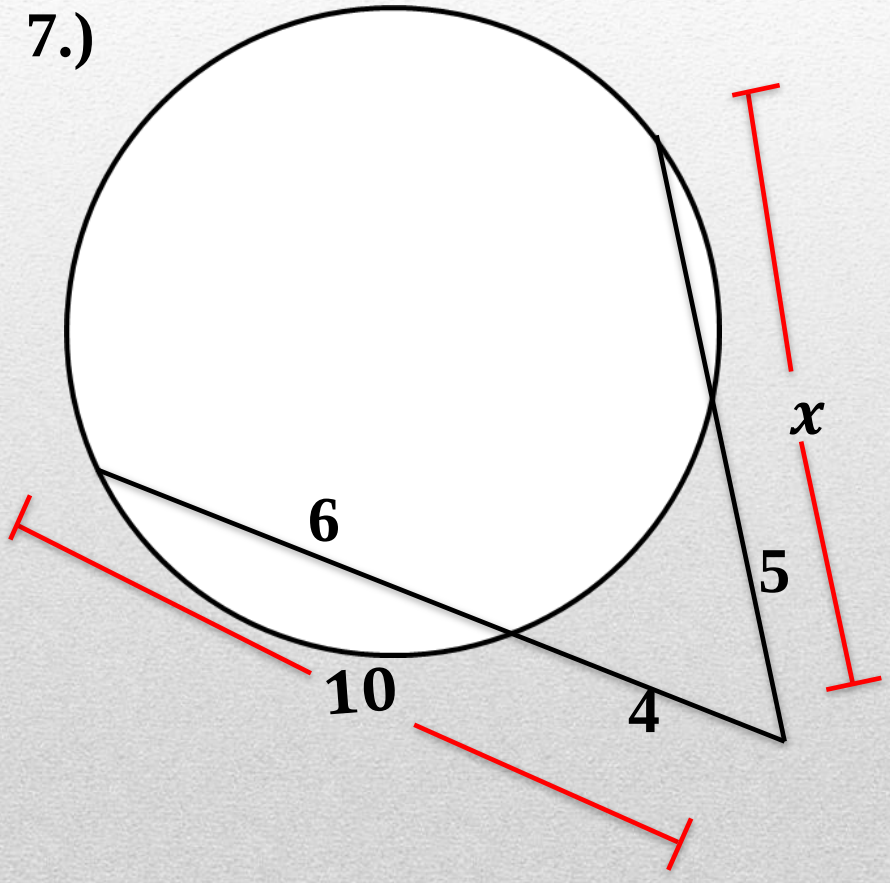
$$x^2 = 27$$

$$\boldsymbol{x = 3\sqrt{3}}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

7.)



Solution

$$x \times 5 = 10 \times 4$$

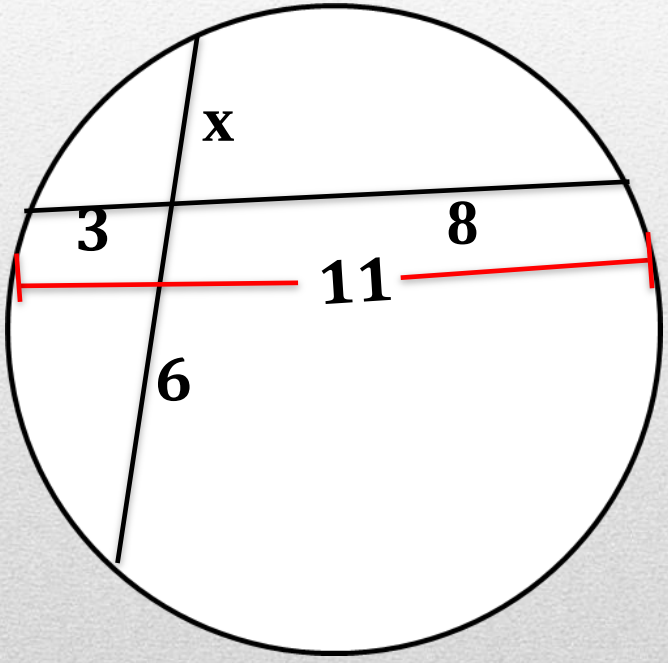
$$5x = 40$$

$$\boldsymbol{x = 8}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

8.)



Solution

$$x \times 6 = 8 \times 3$$

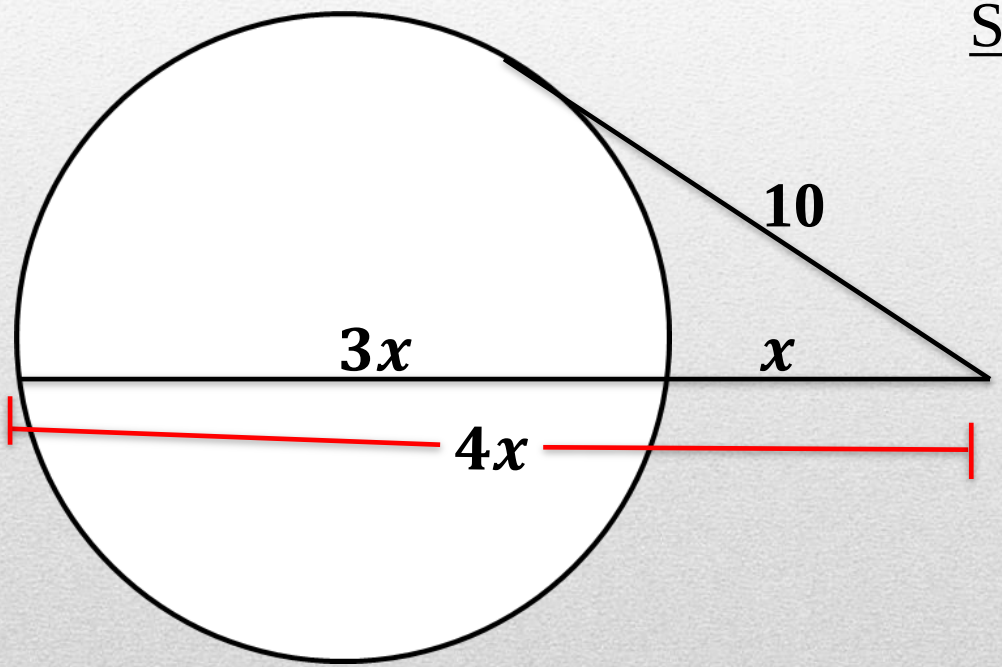
$$6x = 24$$

$$\boldsymbol{x = 4}$$

Group Practice

Chords, Secants, and Tangents are shown. Find the value of x.

9.)



Solution

$$4x \times x = 100$$

$$4x^2 = 100$$

$$x^2 = 25$$

$$\boldsymbol{x = 5}$$