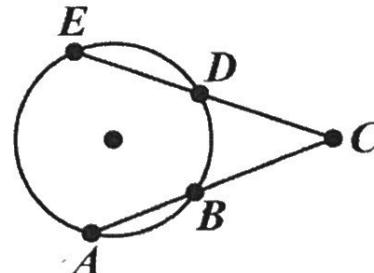


Secant Segment Theorem

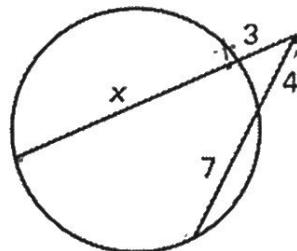
If two secant segments intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the product of the lengths of the second secant segment and its external secant segment.



$$\text{Outside} * \underline{\text{Whole}} = \underline{\text{Outside}} * \text{Whole}$$

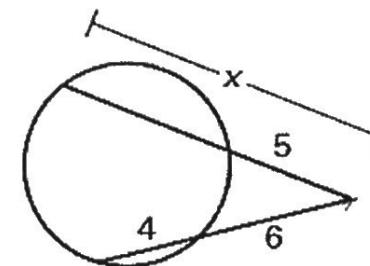
$$\overline{DC} (\overline{DC} + \overline{ED}) = \overline{BC} (\overline{BC} + \overline{BA})$$

Example: Find x.



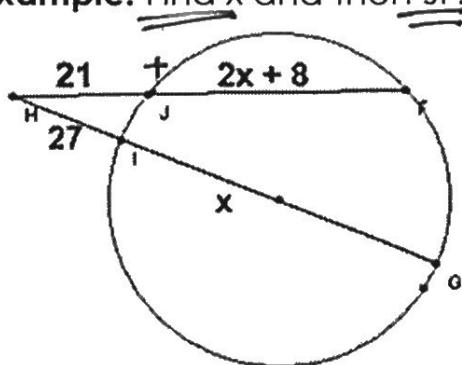
$$\begin{aligned} O.W &= O.W \\ 3(3+x) &= 4(4+7) \\ 9+3x &= 44 \\ -9 & \\ \hline 3x &= 35 \\ x &= \frac{35}{3} \approx 11.67 \end{aligned}$$

Example: Find x.



$$\begin{aligned} S(x) &= 6(6+4) \\ 5x &= 36+24 \end{aligned}$$

Example: Find x and then $\underline{\underline{JF}}$.



$$\begin{aligned} m\overline{JF} &= 2(8) + 8 \\ &\boxed{24} \end{aligned}$$

$$\begin{aligned} 21(21+2x+8) &= 27(27+x) \\ 21(2x+29) &= 729+27x \\ 42x+609 &= 729+27x \\ -27x-609 & \\ \hline 15x &= \frac{120}{15} \\ &\boxed{x=8} \end{aligned}$$

Try:

1. Find the value of x .

$$5(x+5) = 9(7+9)$$

$$5x + 25 = 63 + 81$$

$$5x + 25 = 144$$

$$\frac{5x + 25}{5} = \frac{144}{5}$$

$$x = 23.8$$

2. Find the value of x .

$$10(17+10) = 9(x+9)$$

$$10(27) = 9x + 81$$

$$270 = 9x + 81$$

$$\frac{270 - 81}{9} = \frac{9x}{9}$$

$$x = 21$$

Secant Tangent Theorem	If a tangent and secant intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the square of the length of the tangent segment.		$OW = \underline{\underline{OW}}$ Outside * Whole = Outside * Whole
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Example: Find x .

$$3(24+3) = x(x)$$

$$3(27) = x^2$$

$$\sqrt{81} = \sqrt{x^2}$$

$$9 = x$$

$$-9 \text{ or } 9 \\ \pm 9$$

Example: Find x .

$$(12)^2 = x(16)$$

$$144 = 16x$$

$$\frac{144}{16} = \frac{16x}{16}$$

$$x = 9$$

Example: Find x .

$$(15)^2 = 9(4x+9)$$

$$225 = 36x + 81$$

$$225 - 81 = 36x$$

$$\frac{144}{36} = \frac{36x}{36}$$

$$x = 4$$

Example: Find all possible values of x .

quadratic

$$(x)^2 = (x-2)(x-1+x-2)$$

$$(x-2)(2x-3)$$

$$x^2 = 2x^2 - 7x + 6$$

$$0 = x^2 - 7x + 6$$

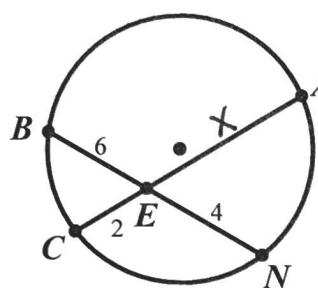
$$0 = (x-1)(x-6)$$

$$\begin{array}{|c|c|} \hline x-2 & 2x^2-4x \\ \hline -3 & -3x \\ \hline 6 & 6 \\ \hline \end{array}$$

$$x = 1, 6$$

Guided Practice: Find the missing indicated segment in each of the following examples.

1. Find \underline{AE} .

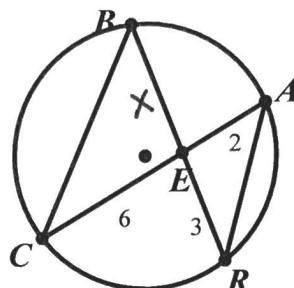


$$6(4) = 2(x)$$

$$24 = 2x$$

$$\boxed{12 = x}$$

2. Find \underline{BE} .

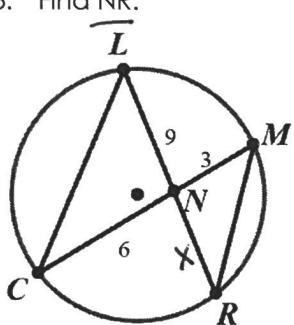


$$3(x) = 6(2)$$

$$3x = 12$$

$$\boxed{x = 4}$$

3. Find \underline{NR} .

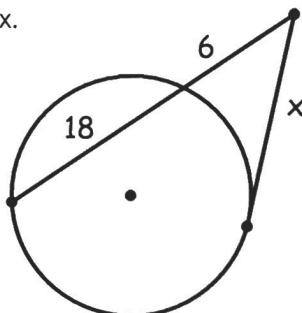


$$9(x) = 6(3)$$

$$9x = 18$$

$$\boxed{x = 2}$$

4. Find x.



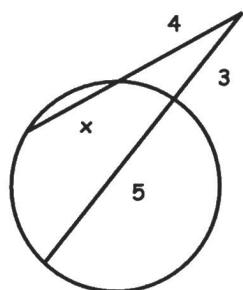
$$x^2 = 6(18+6)$$

$$x^2 = 6(24)$$

$$x^2 = 144$$

$$\boxed{x = 12}$$

5. Find x.



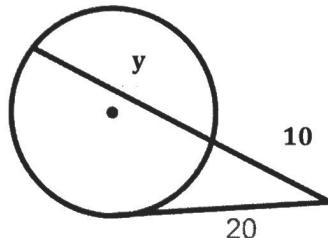
$$4(x+4) = 3(5+3)$$

$$4x + 16 = 15 + 9$$

$$\begin{array}{r} 4x + 16 = 24 \\ -16 \quad -16 \\ \hline 4x = 8 \end{array}$$

$$\boxed{x = 2}$$

6.



$$10(y+10) = (20)^2$$

$$10y + 100 = 400$$

$$\frac{10y}{10} = \frac{300}{10}$$

$$\boxed{y = 30}$$