Theorem

Theorem 10.18 Segments of Chords Theorem

If two chords intersect in the interior of a circle, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord.

Proof Ex. 19, p. 574

$EA \cdot EB = EC \cdot ED$

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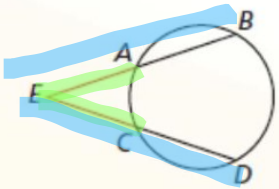
Theorem

Theorem 10.19 Segments of Secants Theorem

If two secant segments share the same endpoint outside a circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment.

Proof Ex. 20, p. 574



$EA \cdot EB = EC \cdot ED$

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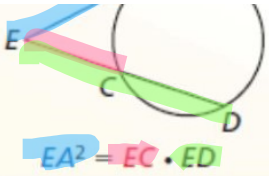
Theorem

Theorem 10.20 Segments of Secants and Tangents Theorem

If a secant segment and a tangent segment share an endpoint outside a circle, then the product of the lengths

of the secant segment and its external segment equals the square of the length of the tangent segment.

Proof Exs. 21 and 22, p. 574



$EA^2 = EC \cdot ED$

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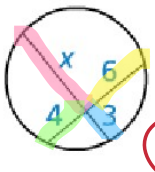
Find the value of x.

1.

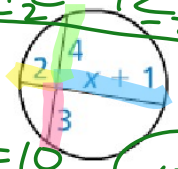


$3x = 4(6)$

$\frac{3x}{3} = \frac{24}{3}$

$x = 8$

2.



$2(x+1) = 4(3)$

$2x + 2 = 12$

$\frac{2x}{2} = \frac{10}{2}$

$x = 5$

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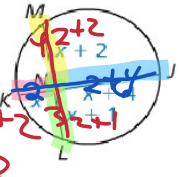
	x	$+2$
x	x^2	$2x$
$+1$	$1x$	2

Find ML and JK.



$x(x+4) = (x+2)(x+1)$

$x^2 + 4x = x^2 + 1x + 2x + 2$

$x^2 + 4x = x^2 + 3x + 2$

$4x = 3x + 2$

$-3x \quad -3x$

$x = 2$

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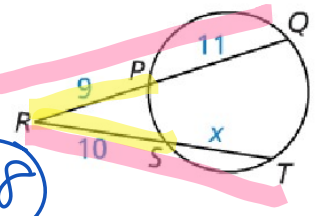
Find the value of x.



$9(20) = 10(10+x)$

$180 = 100 + 10x$

$-100 \quad -100$

$\frac{80}{10} = \frac{10x}{10}$

$x = 8$

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Find the value of x.

3.

$6(15) = 5(x+5)$

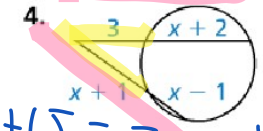
$90 = 5x + 25$

$-25 \quad -25$

$\frac{65}{5} = \frac{5x}{5}$

$x = 13$

4.



$3(x+5) = (x+1)(2x)$

$3x + 15 = 2x^2 + 2x$

$-3x \quad\quad -3x$

$15 = 2x^2 - 1x$

$-15 \quad\quad -15$

$2x^2 - 1x - 15$

$(2x+5)(x-3)$

$-6x$

$-1x$

$2x + 5 = 0$

$x = -\frac{5}{2} = -2.5$

$x - 3 = 0$

$x = 3$

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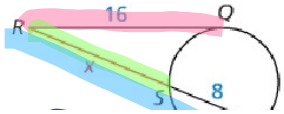
Find RS.

$16^2 = x(x+8)$

$256 = x^2 + 8x$

$-256 \quad -256$



1

$1x^2+8x-256$

ax^2+bx+c

$a=1 \quad b=8 \quad c=-256$

$\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$\frac{-8\pm\sqrt{8^2-4(1)(-256)}}{2(1)}$

$\frac{-8\pm\sqrt{64+1024}}{2}$

$\frac{-8\pm\sqrt{1088}}{2}$

$\frac{-8\pm 33}{2}$

12.5

$\frac{-8+33}{2}$

$\frac{-8-33}{2}$

-20.5

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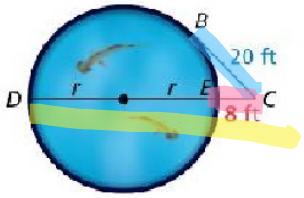
Find the radius of the aquarium tank.



$20^2=8(8+2r)$

$400=64+16r$

$-64 \quad -64$

$\frac{336}{16}=\frac{16r}{16}$

$21=r$

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Find the value of x.

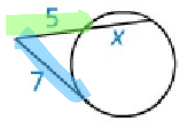
5.

$x^2=1(4)$

$x^2=4$

$x=\sqrt{4}=2$

6.



$7^2=5(5+x)$

$49=25+5x$

$\frac{24}{5}=\frac{5x}{5}$

$4.8=x$

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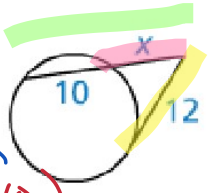
7.



$12^2 = x(x+10)$

$144 = x^2 + 10x$

$-144 \quad -144$

$x^2 + 10x - 144$

$a = 1$

$b = 10$

$c = -144$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\frac{-10 \pm \sqrt{10^2 - 4(1)(-144)}}{2(1)}$

$\frac{-10 \pm \sqrt{100 + 576}}{2}$

$\frac{-10 \pm \sqrt{676}}{2}$

$\frac{-10+26}{2}$ $\quad$ $\frac{-10-26}{2}$

8 $\quad$ -18

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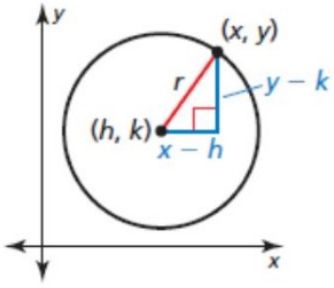
Core Concept

Standard Equation of a Circle

Let (x, y) represent any point on a circle with center (h, k) and radius r. By the Pythagorean Theorem (Theorem 9.1),

$$(x - h)^2 + (y - k)^2 = r^2.$$

This is the **standard equation of a circle** with center (h, k) and radius r.



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