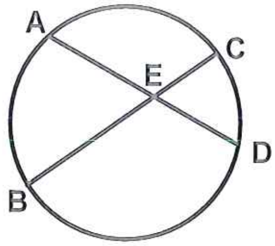
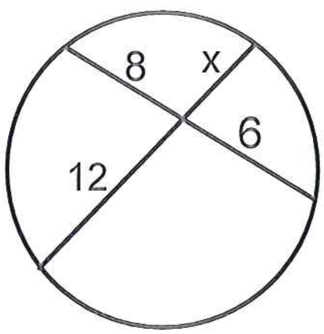
If two chords intersect in the interior of a circle, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord.

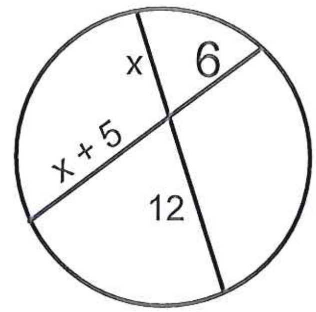


$AE \cdot ED = CE \cdot EB$

Ex: Solve for x.

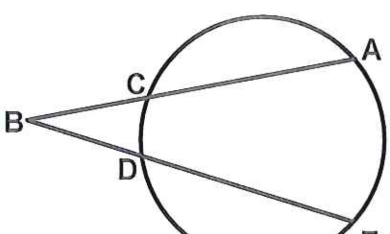
$8 \cdot 6 = 12 \cdot X$
$48 = 12X$
$4 = X$





$12 \cdot X = 6 \cdot (X+5)$
$12X = 6X + 30$
$6X = 30$
$X = 5$

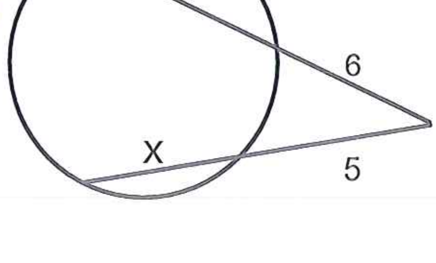
If two secant segments share the same endpoint outside of a circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment.

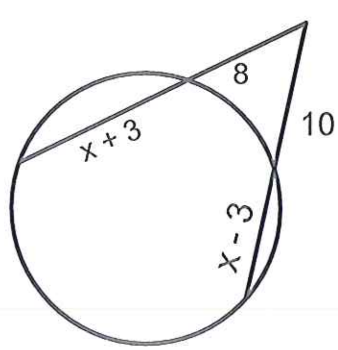


$AB \cdot CB = EB \cdot DB$

Ex: Solve for x.

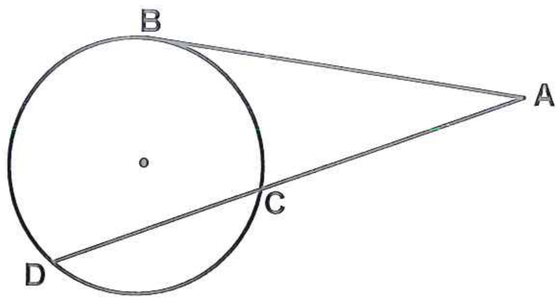
$(4+6) \cdot 6 = (X+5) \cdot 5$
$10 \cdot 6 = 5X + 25$
$60 = 5X + 25$
$35 = 5X$
$7 = X$





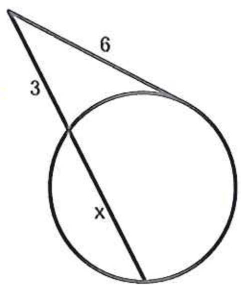
$(X+3+8) \cdot 8 =$
$(X-3+10) \cdot 10$
$(X+11) \cdot 8 = (X+7) \cdot 10$
$8X + 88 = 10X + 70$
$18 = 2X$
$9 = X$

If a secant segment and a tangent segment share an endpoint outside a circle, then the product of the length of the secant segment and its external segment equals the length of the tangent segment squared.

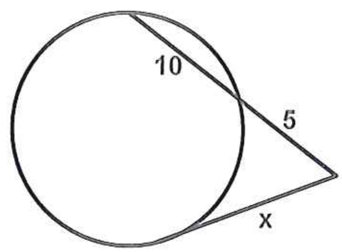


$AB^2 = (AD \cdot AC)$

Ex:

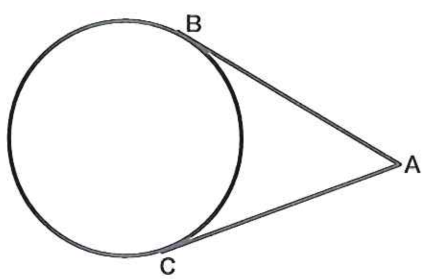


$(3+x) \cdot 3 = 6^2$
$9 + 3x = 36$
$3x = 27$
$x = 9$



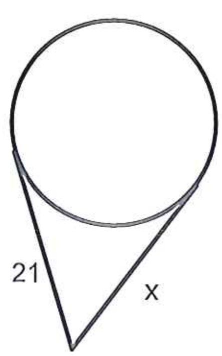
$(10+5) \cdot 5 = x^2$
$15 \cdot 5 = x^2$
$\sqrt{75} = \sqrt{x^2}$
$8.66 = x$

If two segments are tangent to a circle from the same external point, then the segments are congruent.

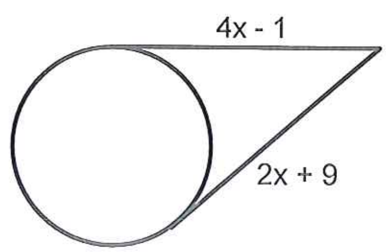


$AB = AC$

Ex: Solve for x.

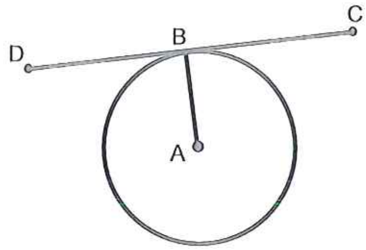


$x = 21$



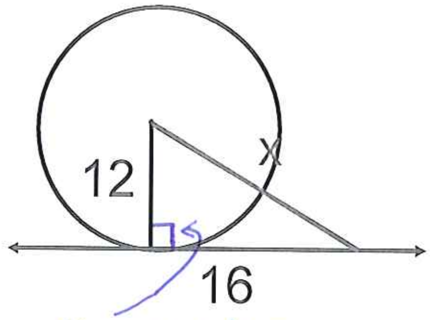
$4x - 1 = 2x + 9$
$2x - 1 = 9$
$2x = 10$
$x = 5$

If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency.

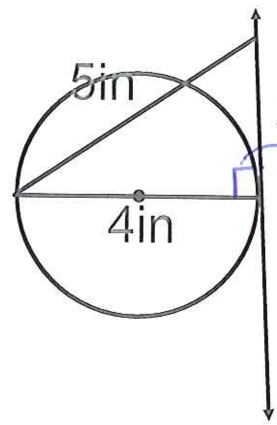


$\overline{DC} \perp \overline{AB}$ which means $\angle DBA$ and $\angle CBA$ are right angles!

Ex: Solve for x.

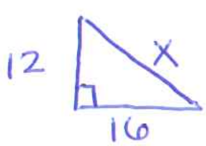


this would be a right angle!

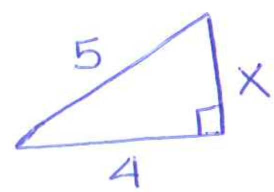


This would be a right angle.

So we have a right triangle and can use the Pythagorean Theorem!



$$12^2 + 16^2 = x^2$$
$$144 + 256 = x^2$$
$$400 = x^2$$
$$\sqrt{400} = \sqrt{x^2}$$
$$\boxed{20 = x}$$



$$x^2 + 4^2 = 5^2$$
$$x^2 + 16 = 25$$
$$x^2 = 9$$
$$\sqrt{x^2} = \sqrt{9}$$
$$\boxed{x = 3}$$