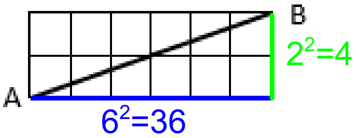
9.Blank: Intersecting Chords and Secants

Warm-Ups:

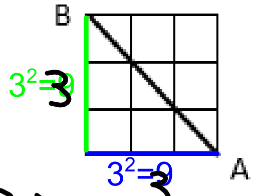
a) Find AB (you do not need to simplify the radical)

$6^2+2^2=AB^2$

$40=AB^2$



$AB=\sqrt{36+4}=\sqrt{40}$



$AB=\sqrt{9+9}=\sqrt{18}$

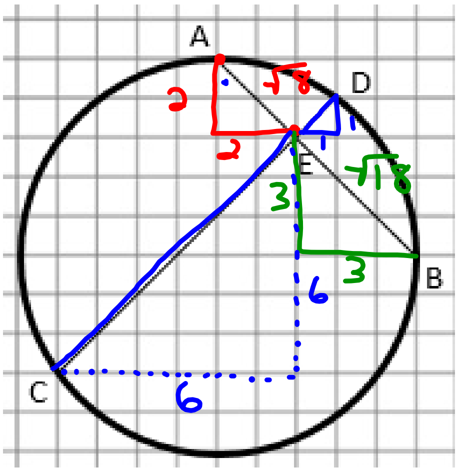
$3^2+3^2=AB^2$

$18=AB^2$

b) Multiply the following radicals

$(\sqrt{12})(\sqrt{5})=$ $\sqrt{60}$

$(\sqrt{72})(\sqrt{2})=$ $\sqrt{144}=12$



$AE = \sqrt{2^2+2^2}$

AE = $\sqrt{2^2 + 2^2} = \sqrt{4 + 4} = \sqrt{8}$

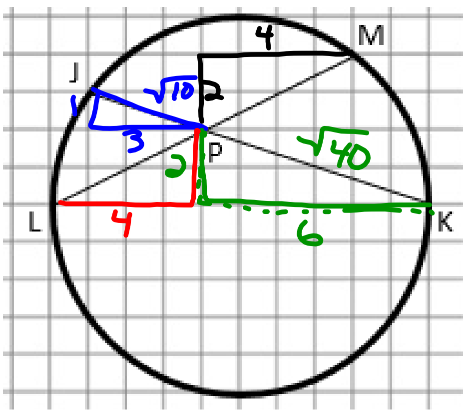
BE = $\sqrt{3^2 + 3^2} = \sqrt{9 + 9} = \sqrt{18}$

AE*BE = $\sqrt{8} * \sqrt{18} = \sqrt{144} = 12$

CE = $\sqrt{6^2 + 6^2} = \sqrt{36+36} = \sqrt{72}$

DE = $\sqrt{1^2 + 1^2} = \sqrt{1 + 1} = \sqrt{2}$

CE*DE = $\sqrt{72} * \sqrt{2} = \sqrt{144} = 12$



JP = $\sqrt{3^2 + 1^2} = \sqrt{9 + 1} = \sqrt{10}$

PK = $\sqrt{6^2 + 2^2} = \sqrt{36 + 4} = \sqrt{40}$

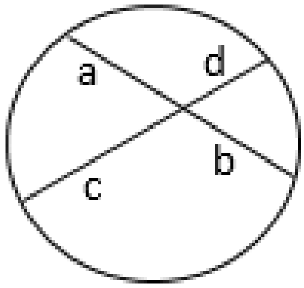
JP*PK = $\sqrt{10} * \sqrt{40} = \sqrt{400} = 20$

LP = $\sqrt{4^2 + 2^2} = \sqrt{16 + 4} = \sqrt{20}$

PM = $\sqrt{4^2 + 2^2} = \sqrt{16 + 4} = \sqrt{20}$

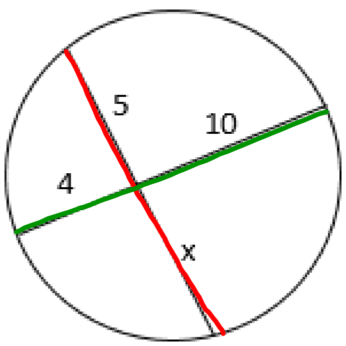
LP*PM = $\sqrt{20} * \sqrt{20} = \sqrt{400} = 20$

If two chords intersect in a circle, they cut each other proportionally. Algebra yields that the product of the lengths of the sections from the first chord is equal to the product of the lengths of the sections from the second chord.
According to this graphic, an appropriate equation is ...



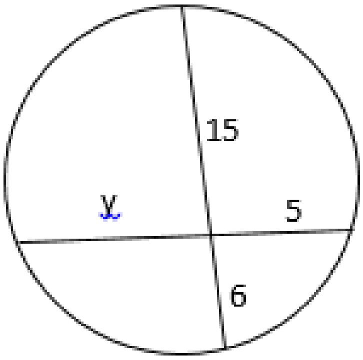
$$a*b = c*d$$

Ex 1]



$$5x = 4 \cdot 10$$
$$5x = 40$$
$$x = 8$$

Ex 2]

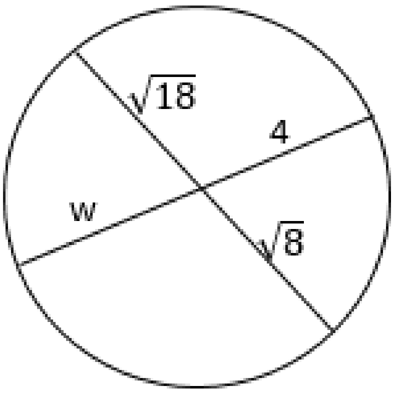


$5y = 6 \cdot 15$

$5y = 90$

$y = 18$

Ex 3]



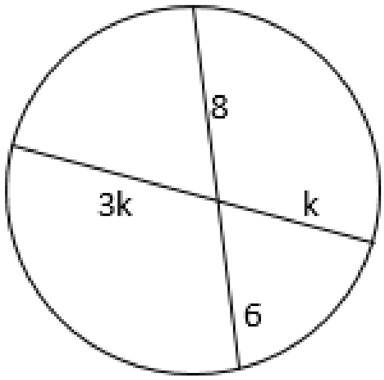
$4w = \sqrt{8} \cdot \sqrt{18}$

$4w = \sqrt{144}$

$4w = 12$

$w = 3$

Ex 4]



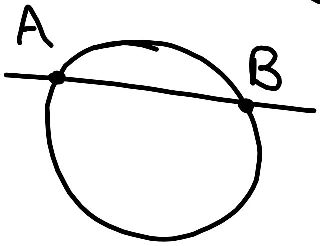
$$3k \cdot k = 6 \cdot 8$$

$$\frac{3k^2}{3} = \frac{48}{3}$$

$$k^2 = 16$$

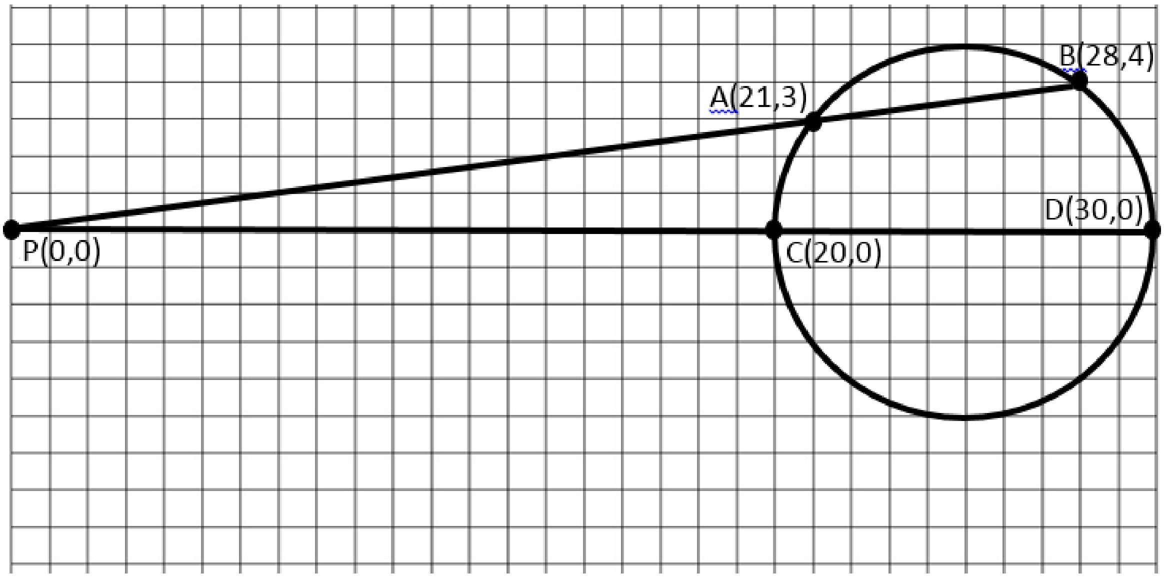
$$k = \sqrt{16} = 4$$

Secant - any line that intersects a circle in two points.



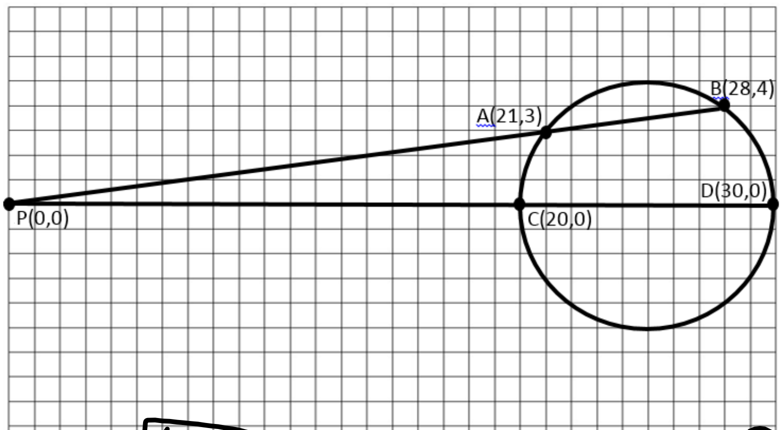
$\overline{AB}$ - chord

$\overleftrightarrow{AB}$ - secant



$PA = \sqrt{21^2 + 3^2} = \sqrt{450}$

$PB = \sqrt{28^2 + 4^2} = \sqrt{800}$



PA = $\sqrt{450}$ part

PB = $\sqrt{800}$ whole

PA*PB = $\sqrt{450} \cdot \sqrt{800} = \sqrt{360000}$

$= 600$

PC = 20 part

PD = 30 whole

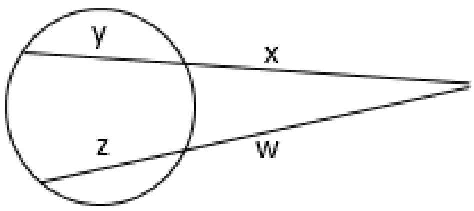
PC*PD = $20 \cdot 30 = 600$

part·whole = part·whole

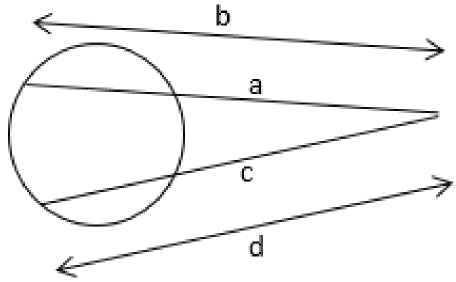
In the figure above, line PB and line PD are called *secants* because they each intersect the circle in two places.

If two secants meet at a common point (P), then there is a relationship among the lengths of the segments created by the common point and the intersections with the circle.

The distances from the common point to the near intersections times the distances from the common point to the far intersections are equal for the two secants.

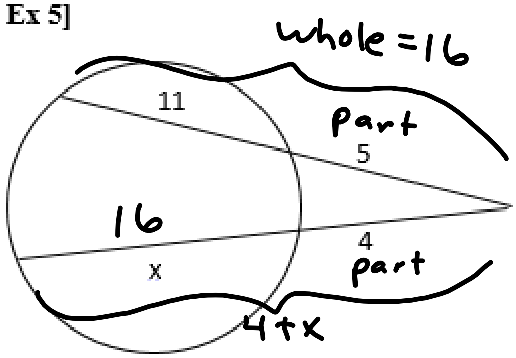


$$X(X + Y) = W(W + Z)$$



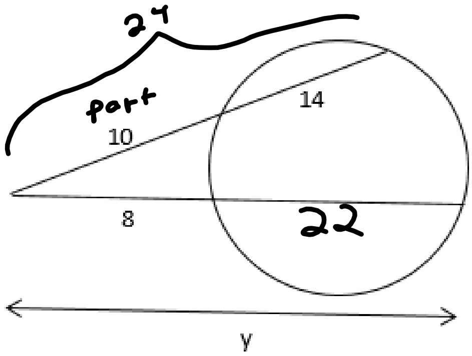
$$ab = cd$$

Ex 5]

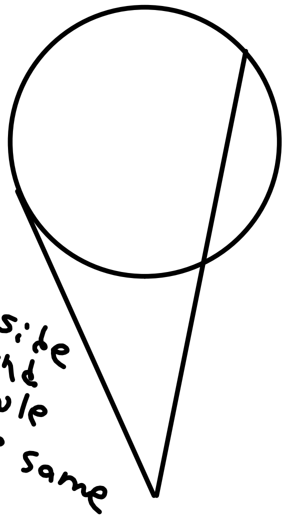


$$5 \cdot 16 = 4(4+x)$$
$$80 = 16 + 4x$$
$$64 = 4x$$
$$16 = x$$

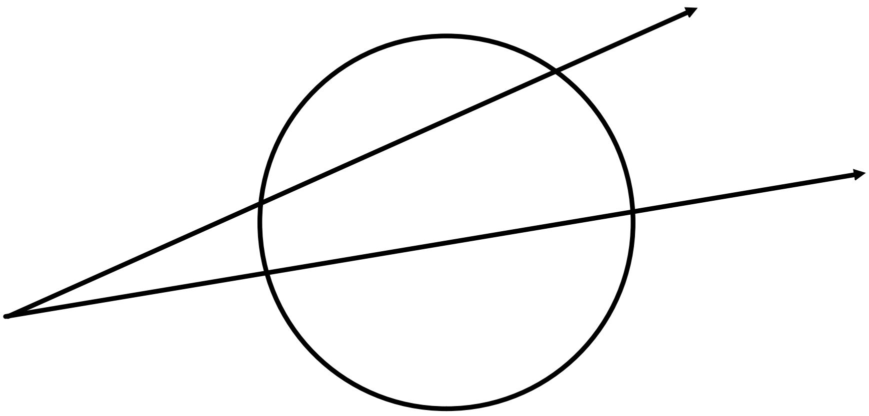
Ex 6]



$$10 \cdot 24 = 8 \cdot y$$
$$240 = 8y$$
$$30 = y$$

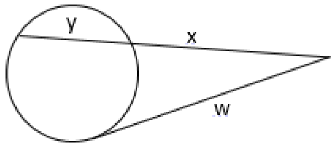


outside and whole are same

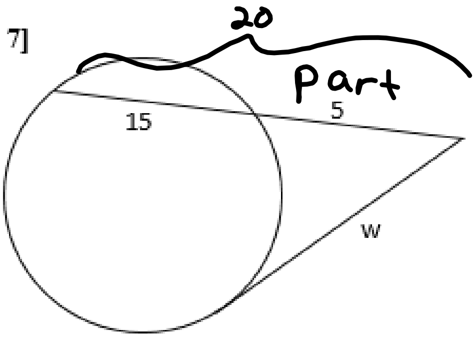


There is a special case when one of the secants is actually a tangent. In that case, the length of the tangent segment is squared for use within the formula.

$X(X + Y) = W^2$



Ex 7]

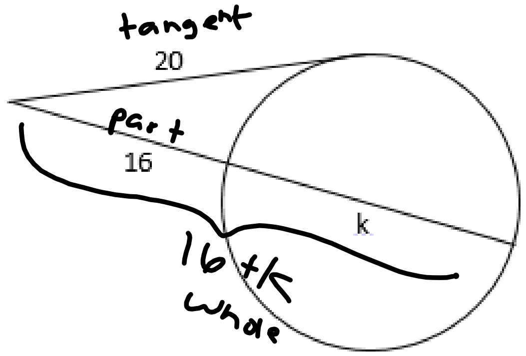


$w^2 = 5 \cdot 20$

$w^2 = 100$

$\boxed{w = 10}$

Ex 8]



$$20^2 = 16(16+k)$$
$$400 = 256 + 16k$$
$$144 = 16k$$
$$9 = k$$

Assignment:

Worksheet 9.Blank HW

Assignment: Circles Review #1 (Key is on website)

Complete the Circles Quiz #1-A by the end of class on Monday.