Name
Adv Geo
10-8: Power-Chord Theorems

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W 1 May 2013

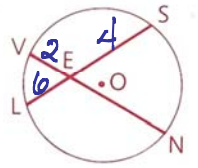
Objective

After studying this section, you will be able to

- Apply the power theorems

Theorem 95 ***If two chords of a circle intersect inside the circle, then the product of the measures of the segments of one chord is equal to the product of the measures of the segments of the other chord. (Chord-Chord Power Theorem)***

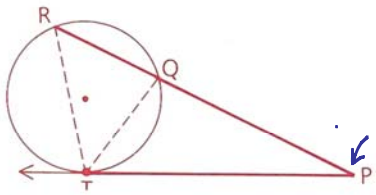
inside · inside = inside · inside
$EV \cdot EN = EL \cdot SE$
$2 \cdot EN = 6 \cdot 4$
$EN = \frac{6 \cdot 4}{2} = 12$



Given: Chords $\overline{VN}$ and $\overline{LS}$ intersect at point E inside circle O.
Prove: $EV \cdot EN = EL \cdot SE$

Theorem 96 ***If a tangent segment and a secant segment are drawn from an external point to a circle, then the square of the measure of the tangent segment is equal to the product of the measures of the entire secant segment and its external part. (Tangent-Secant Power Theorem)***

outside · outside = outside (whole)
$TP \cdot TP = PQ \cdot PR$
$TP^2 = PQ \cdot PR$

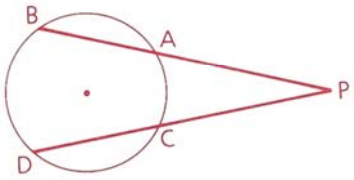


Given: $\overline{PR}$ is a secant segment.
$\overline{PT}$ is a tangent segment.
Prove: $(TP)^2 = (PR)(PQ)$

Theorem 97 ***If two secant segments are drawn from an external point to a circle, then the product of the measures of one secant segment and its external part is equal to the product of the measures of the other secant segment and its external part. (Secant-Secant Power Theorem)***

outside(whole) = outside(whole)
$PA \cdot PB = PC \cdot PD$

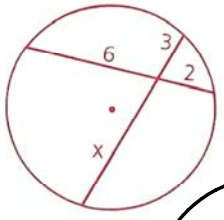
Given: Secant segments $\overline{PB}$ and $\overline{PD}$
Prove: $PB \cdot PA = PD \cdot PC$



Part Two: Sample Problems

Problem 1 Find x, y, and z. No Neg lengths this year.

a

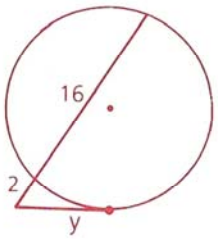


$6 \cdot 2 = 3x$

$\frac{2 \cdot 6 \cdot 2}{3_1} = x$

$4 = x$

b



CAUTION

$16 \cdot 2 = y \cdot y$

$\sqrt{16 \cdot 2} = \sqrt{y \cdot y}$

$4\sqrt{2} = y$

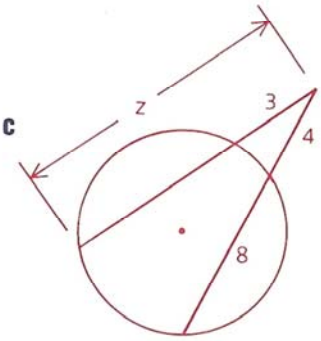
$2(18) = y^2$

$\sqrt{2 \cdot 2 \cdot 9} = \sqrt{y^2}$

$2 \cdot 3 = y$

$6 = y$

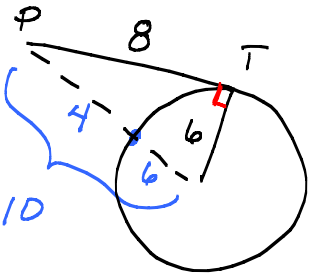
c

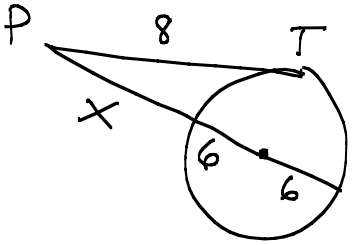


$3(z) = 4(12)$

$z = \frac{4 \cdot 12^4}{3_1} = 16$

Problem 2 *Tangent segment PT measures 8 cm. The radius of the circle is 6 cm. Find the distance from P to the circle.* 4cm





$8^2 = x(x+12)$

$0 = x^2 + 12x - 64$

$0 = (x-4)(x+16)$

$x = 4$ or $x = -16$

no neg lengths this yr

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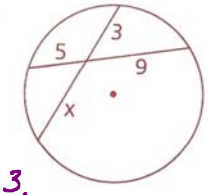
1 Solve for x, y, and z.

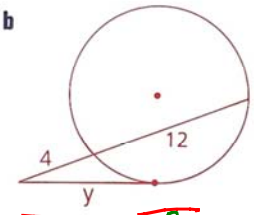
a



$\frac{5 \cdot 9}{3} = \frac{3 \cdot x}{3}$

$15 = x$

b

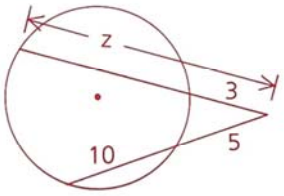


$\sqrt{4(16)} = \sqrt{y^2}$

$2 \cdot 4 = y$

$8 = y$

c



$\frac{5(15)}{3} = \frac{3(z)}{3}$

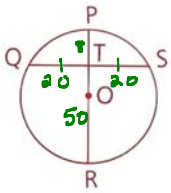
$25 = z$

2 T is the midpoint of $\overline{QS}$, PT = 8, and QS = 40.

a Find TR. = 50

b Find the diameter of ⊙O.

PT + TR = 58



$\frac{8}{8}(TR) = \frac{20 \cdot 20}{4 \cdot 2} = 50$

3 **a** If TR = 10 and QR = 5, find PR. = 20

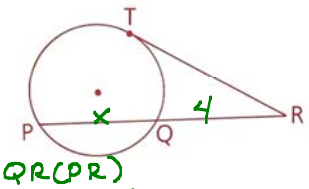
b If TR = 10 and QR = 4, find PQ. = 21

c If TR = 10 and PR = 50, find PQ.

3a. $TR^2 = QR(PR)$

$10^2 = 5(PR)$

$20 = PR$



3b $TR^2 = QR(PR)$

$10^2 = 4(4+x)$

$100 = 16 + 4x$

$84 = 4x$

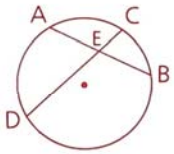
$21 = x$

3c. $TR^2 = RP(QR)$

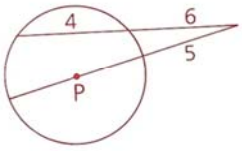
4 **a** If AE = 6.4, AB = 8.9, and CE = 1.6, find ED.

b If AE = 8, AB = 14, and ED = 16, find DC.

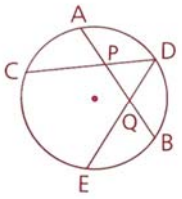
c If CE = 2, ED = 18, and $\overline{AE} \cong \overline{EB}$, find AB.



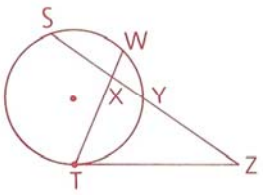
5 Find the radius of ⊙P.



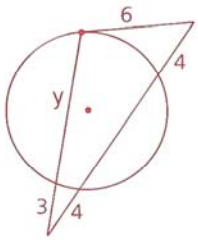
6 Given: AP = 3, PQ = 5, QB = 7, CP = 2, QD = 14
Find: PD and EQ



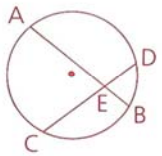
7 Given: TZ = 6, YZ = 4, SX = 3, WX = 1
Find: XT (Hint: Find SZ.)



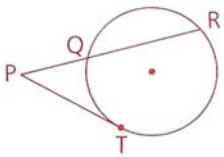
8 **a** Find *y*.
b Is the triangle acute, right, or obtuse?



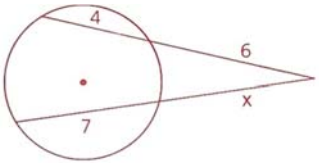
9 Given: AB = 7, CD = 5, ED = 2
Find: AE



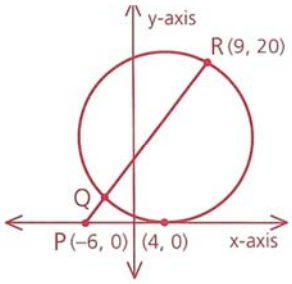
10 Given: PT = 3, QR = 8
Find: PQ



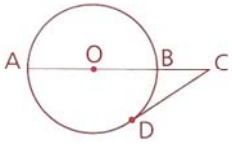
11 Solve for x.



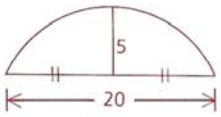
12 Find PQ.



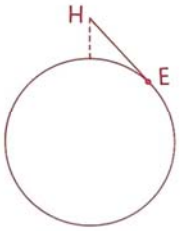
13 $\overline{AB}$ is a diameter of $\odot O$.
$\overline{CD}$ is tangent at D, CD = 6, and BC = 4.
Find the radius of the circle.



14 An arch supports a pipeline across a river 20 m wide. Midway, the suspending cable is 5 m long. Find the radius of the arch.



15 The diameter of the earth is approximately 8000 mi. Heavenly Helen, in a spaceship 100 mi above the earth, sights Earthy Ernest coming over the horizon. Approximately how far apart are Helen and Ernest?



16 Solve for x.