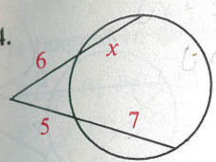
4.



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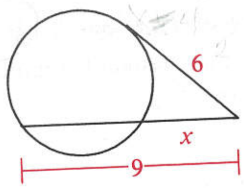

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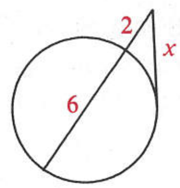
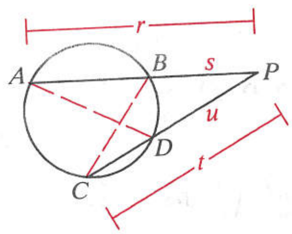


7. Supply reasons to complete the proof of Theorem 7–12.

Given: $\overline{PA}$ and $\overline{PC}$ drawn to the circle from point P

Prove: $r \cdot s = t \cdot u$



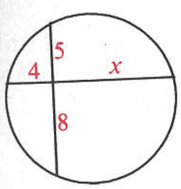
Proof:

1. Draw chords $\overline{AD}$ and $\overline{BC}$.
2. $\angle A \cong \angle C$
3. $\angle P \cong \angle P$
4. $\triangle APD \sim \triangle CPB$
5. $\frac{r}{t} = \frac{u}{s}$
6. $r \cdot s = t \cdot u$

Written Exercises

Chords, secants, and tangents are shown. Find the value of x.

A **1.**



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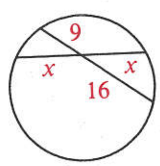

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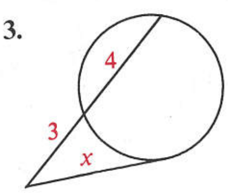

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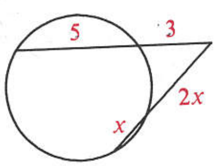

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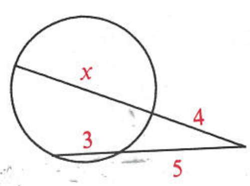

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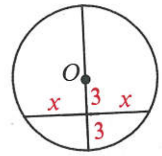

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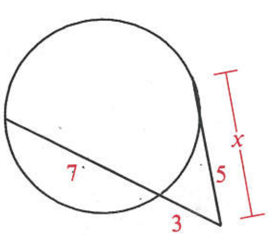

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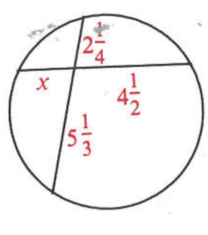

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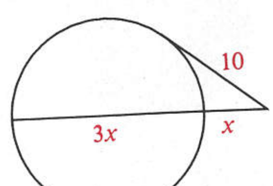
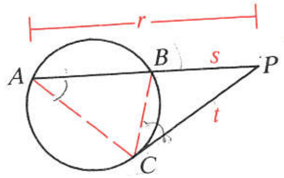


10. Copy and complete the proof of Theorem 7–13.
Given: Secant segment $\overline{PA}$ and tangent segment $\overline{PC}$ drawn to the circle from P.
Prove: $r \cdot s = t^2$

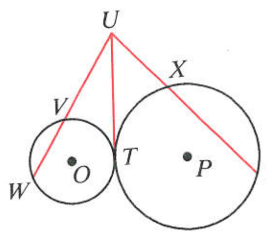


Proof:

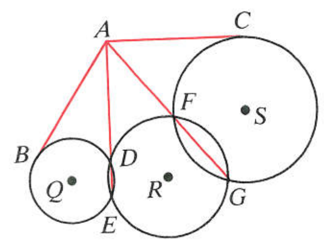
Statements	Reasons
1. Draw chords $\overline{AC}$ and $\overline{BC}$.	1. __?__
2. $m\angle A = \frac{1}{2}m\widehat{BC}$	2. __?__
3. $m\angle BCP = \frac{1}{2}m\widehat{BC}$	3. The measure of an angle formed by a chord and a tangent __?__.
4. $\angle A \cong \angle BCP$	4. __?__
5. $\angle P \cong \angle P$	5. __?__

(*Hint:* You need three more steps. Apply similar triangles as in Classroom Exercise 7.)

B **11.** Given: $\odot O$ and $\odot P$ are tangent at T.
Prove: $UV \cdot UW = UX \cdot UY$



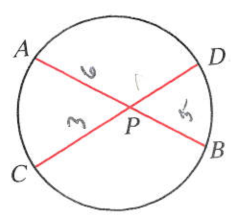
12. Given: $\overline{AB}$ is tangent to $\odot Q$; $\overline{AC}$ is tangent to $\odot S$.
Prove: $\overline{AB} \cong \overline{AC}$



Chords $\overline{AB}$ and $\overline{CD}$ intersect at P. Find the lengths indicated.

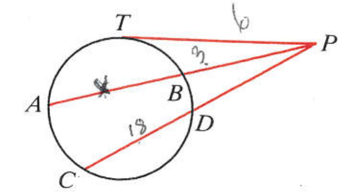
Example: $AP = 5$; $BP = 4$; $CD = 12$; $CP =$ __?__

Solution: Let $CP = x$. Then $DP = 12 - x$.
$x(12 - x) = 5 \cdot 4$
$12x - x^2 = 20$
$x^2 - 12x + 20 = 0$
$(x - 2)(x - 10) = 0$
$x = 2$ or $x = 10$
$CP = 2$ or 10

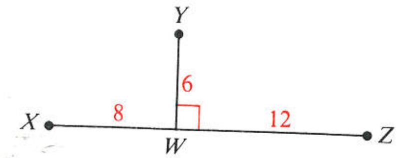


13. $AP = 6$; $BP = 8$; $CD = 16$; $DP =$ __?__
14. $CD = 10$; $CP = 6$; $AB = 11$; $AP =$ __?__
15. $AB = 12$; $CP = 9$; $DP = 4$; $BP =$ __?__
16. $AP = 6$; $BP = 5$; $CP = 3 \cdot DP$; $DP =$ __?__

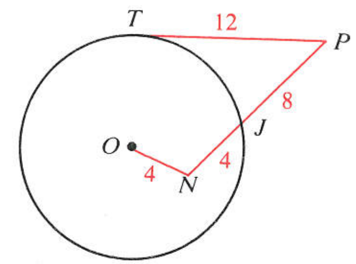
$\overline{PT}$ is tangent to the circle. Find the lengths indicated.



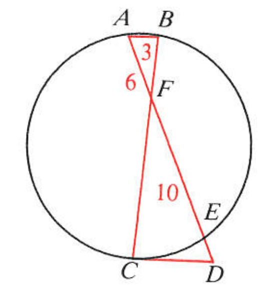
17. $PT = 6$; $PB = 3$; $AB =$ __?__
18. $PT = 12$; $CD = 18$; $PC =$ __?__
19. $PD = 5$; $CD = 7$; $AB = 11$; $PB =$ __?__
20. $PB = AB = 5$; $PD = 4$; $PT =$ __?__ and $PC =$ __?__
21. A circle can be drawn through points X, Y, and Z.
   a. What is the radius of the circle?
   b. How far is the center of the circle from point W?



C **22.** $\overline{PT}$ is tangent to $\odot O$ and $\overline{PN}$ intersects $\odot O$ at J. Find the radius of the circle.



Ex. 22



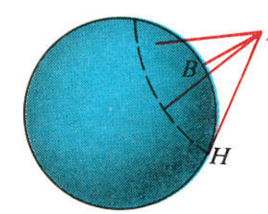
Ex. 23

★**23.** In the diagram at the right above, $\overline{CD}$ is a tangent, $\widehat{AC} \cong \widehat{BC}$, $AB = 3$, $AF = 6$, and $FE = 10$. Find ED.

Application

DISTANCE TO THE HORIZON

If you look out over the surface of the Earth from a position at P, directly above point B on the surface, you see the horizon wherever your line of sight is tangent to the surface of the Earth. If the surface around B is smooth (say you are on the ocean on a calm day), the horizon will be a circle, and the higher your lookout is, the farther away this horizon circle will be.



You can use Theorem 7–13 to derive a formula that tells how far you can see from any given height. As shown on the following page, the picture is simpler if you imagine a section through the Earth containing P, H, and O, the center of the Earth.