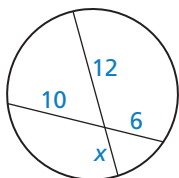## Vocabulary and Core Concept Check

1. **VOCABULARY** The part of the secant segment that is outside the circle is called a(n) _____.

2. **WRITING** Explain the difference between a tangent segment and a secant segment.
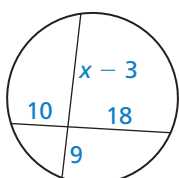
Monitoring Progress and Modeling with Mathematics

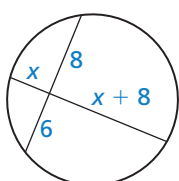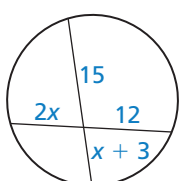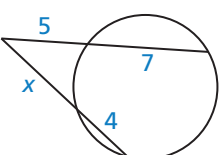**In Exercises 3–6, find the value of x.** *(See Example 1.)*

3.

12
10
6
x

4.

$x - 3$
10
18
9

5.

x
8
$x + 8$
6

6.

15
$2x$
12
$x + 3$

In Exercises 7–10, find the value of x. *(See Example 2.)*

7.

10
6
x
8

8.

5
7
x
4

9.

5
4
$x + 4$
$x - 2$

10.
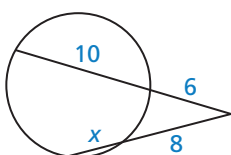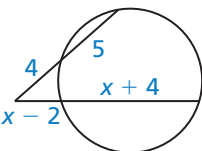
45
x
27
50
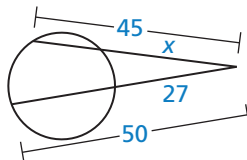
In Exercises 11–14, find the value of x. *(See Example 3.)*

11.

x
7
9

12.

24
12
x

13.

12
x
$x + 4$

14.

$\sqrt{3}$
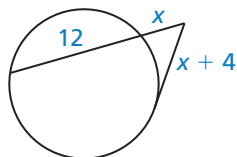2
x
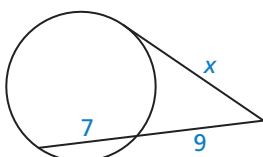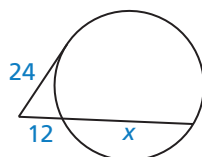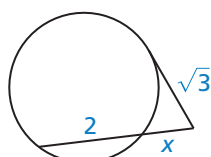
15. **ERROR ANALYSIS** Describe and correct the error in finding CD.

✗

F 3 A 5 B
4
D
C

$CD \cdot DF = AB \cdot AF$
$CD \cdot 4 = 5 \cdot 3$
$CD \cdot 4 = 15$
$CD = 3.75$

16. **MODELING WITH MATHEMATICS** The Cassini spacecraft is on a mission in orbit around Saturn until September 2017. Three of Saturn's moons, Tethys, Calypso, and Telesto, have nearly circular orbits of radius 295,000 kilometers. The diagram shows the positions of the moons and the spacecraft on one of Cassini's missions. Find the distance DB from Cassini to Tethys when $\overline{AD}$ is tangent to the circular orbit. *(See Example 4.)*

83,000 km
Tethys
Calypso
D
B
C
Cassini
Saturn
203,000 km
Telesto
A
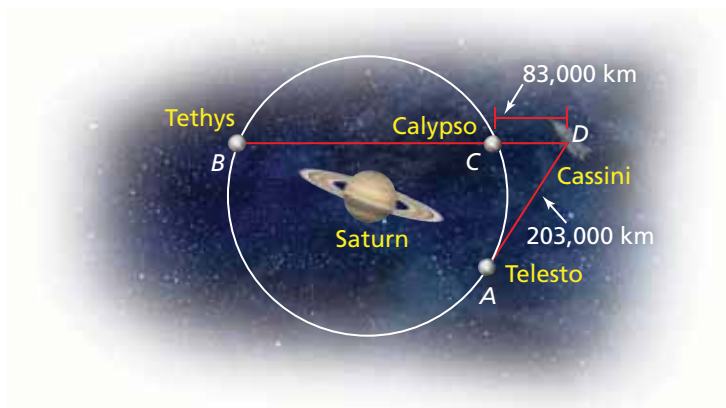
17. MODELING WITH MATHEMATICS The circular stone mound in Ireland called Newgrange has a diameter of 250 feet. A passage 62 feet long leads toward the center of the mound. Find the perpendicular distance x from the end of the passage to either side of the mound.
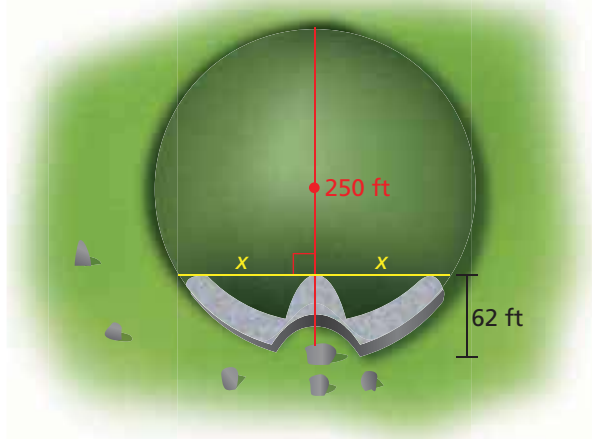
**18. MODELING WITH MATHEMATICS** You are designing an animated logo for your website. Sparkles leave point C and move to the outer circle along the segments shown so that all of the sparkles reach the outer circle at the same time. Sparkles travel from point C to point D at 2 centimeters per second. How fast should sparkles move from point C to point N? Explain.
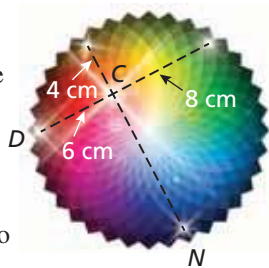

19. PROVING A THEOREM Write a two-column proof of the Segments of Chords Theorem (Theorem 10.18).

Plan for Proof Use the diagram from page 574. Draw $\overline{AC}$ and $\overline{DB}$. Show that $\triangle EAC$ and $\triangle EDB$ are similar. Use the fact that corresponding side lengths in similar triangles are proportional.

20. PROVING A THEOREM Prove the Segments of Secants Theorem (Theorem 10.19). (*Hint*: Draw a diagram and add auxiliary line segments to form similar triangles.)

21. PROVING A THEOREM Use the Tangent Line to Circle Theorem (Theorem 10.1) to prove the Segments of Secants and Tangents Theorem (Theorem 10.20) for the special case when the secant segment contains the center of the circle.

22. PROVING A THEOREM Prove the Segments of Secants and Tangents Theorem (Theorem 10.20). (*Hint*: Draw a diagram and add auxiliary line segments to form similar triangles.)

23. WRITING EQUATIONS In the diagram of the water well, AB, AD, and DE are known. Write an equation for BC using these three measurements.
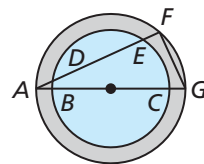
24. HOW DO YOU SEE IT? Which two theorems would you need to use to find PQ? Explain your reasoning.
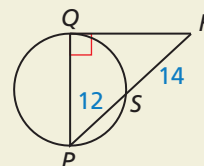
25. CRITICAL THINKING In the figure, $AB = 12$, $BC = 8$, $DE = 6$, $PD = 4$, and A is a point of tangency. Find the radius of $\odot P$.
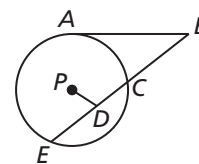
26. THOUGHT PROVOKING Circumscribe a triangle about a circle. Then, using the points of tangency, inscribe a triangle in the circle. Must it be true that the two triangles are similar? Explain your reasoning.

Maintaining Mathematical Proficiency
Reviewing what you learned in previous grades and lessons

Solve the equation by completing the square. *(Skills Review Handbook)*

27. $x^2 + 4x = 45$

28. $x^2 - 2x - 1 = 8$

29. $2x^2 + 12x + 20 = 34$

30. $-4x^2 + 8x + 44 = 16$