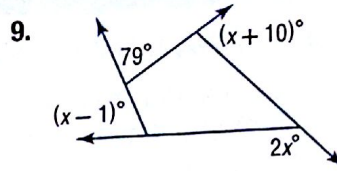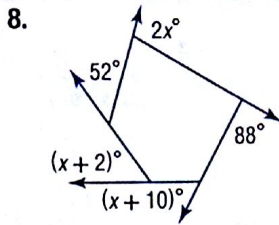**Example 4** Find the value of x in each diagram.

8.

9.

Find the measure of each exterior angle of each regular polygon.

10. quadrilateral

11. octagon

Practice and Problem Solving

Example 1 Find the sum of the measures of the interior angles of each convex polygon.

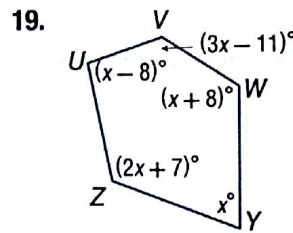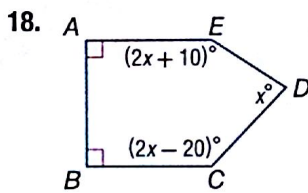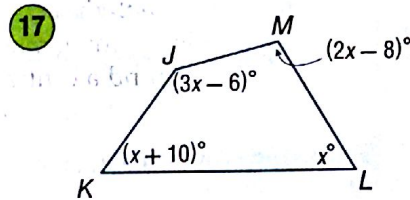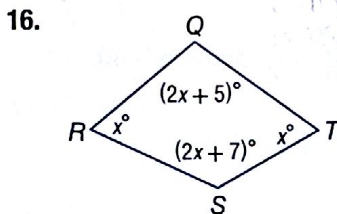**12.** dodecagon **13.** 20-gon **14.** 29-gon **15.** 32-gon

Find the measure of each interior angle.

16.

(17)

18.

19.

20. BASEBALL In baseball, home plate is a pentagon. The dimensions of home plate are shown. What is the sum of the measures of the interior angles of home plate?
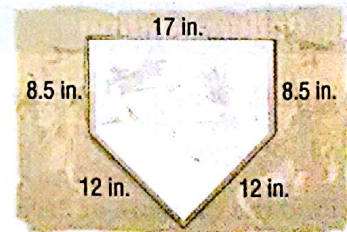
Example 2 Find the measure of each interior angle of each regular polygon.

21. dodecagon **22.** pentagon **23.** decagon **24.** nonagon

25. GAMES Hexagonal chess is played on a regular hexagonal board comprised of 92 small hexagons in three colors. The chess pieces are arranged so that a player can move any piece at the start of a game.

  a. What is the sum of the measures of the interior angles of the chess board?

  b. Does each interior angle have the same measure? If so, give the measure. Explain your reasoning.

Example 3 The measure of an interior angle of a regular polygon is given. Find the number of sides in the polygon.
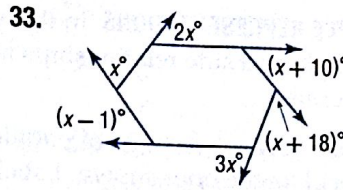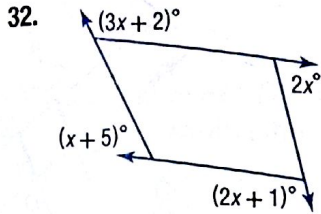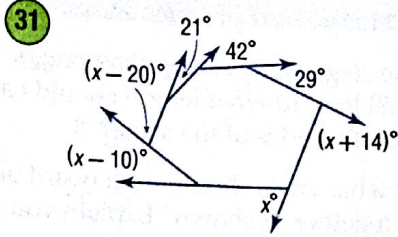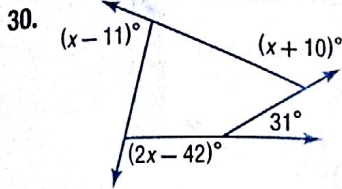
26. 60 **27.** 90 **28.** 120 **29.** 156

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Example 4 Find the value of x in each diagram.

30.

$(x-11)°$ $(x+10)°$ $31°$ $(2x-42)°$

31.

$21°$ $42°$ $(x-20)°$ $29°$ $(x-10)°$ $(x+14)°$ $x°$

32.

$(3x+2)°$ $2x°$ $(x+5)°$ $(2x+1)°$

33.

$2x°$ $x°$ $(x+10)°$ $(x-1)°$ $(x+18)°$ $3x°$

Find the measure of each exterior angle of each regular polygon.

34. decagon   **35.** pentagon   **36.** hexagon   **37.** 15-gon

38. COLOR GUARD During the halftime performance for a football game, the color guard is planning a new formation in which seven members stand around a central point and stretch their flag to the person immediately to their left as shown.
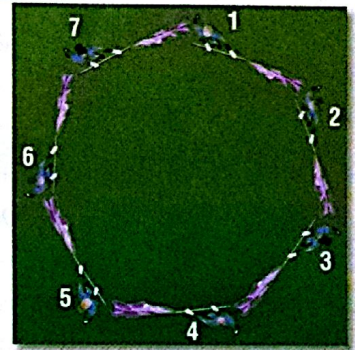
a. What is the measure of each exterior angle of the formation?

b. If the perimeter of the formation is 38.5 feet, how long is each flag?

Find the measures of an exterior angle and an interior angle given the number of sides of each regular polygon. Round to the nearest tenth, if necessary.

39. 7   **40.** 13   **41.** 14

42. PROOF Write a paragraph proof to prove the Polygon Interior Angles Sum Theorem for octagons.

43. PROOF Use algebra to prove the Polygon Exterior Angles Sum Theorem.

44. PHOTOGRAPHY The aperture on the camera lens shown is a regular 14-sided polygon.

a. What is the measure of each interior angle of the polygon?

b. What is the measure of each exterior angle of the polygon?
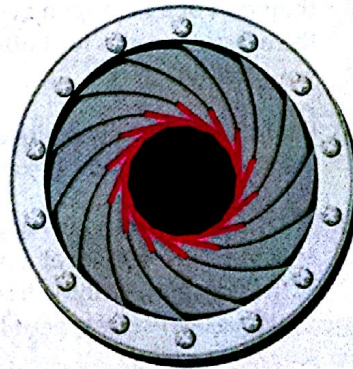
ALGEBRA Find the measure of each interior angle.

45. decagon, in which the measures of the interior angles are $x+5$, $x+10$, $x+20$, $x+30$, $x+35$, $x+40$, $x+60$, $x+70$, $x+80$, and $x+90$

46. polygon $ABCDE$, in which the measures of the interior angles are $6x$, $4x+13$, $x+9$, $2x-8$, $4x-1$