MM1G3a Determine the sum of interior and exterior angles in a polygon.

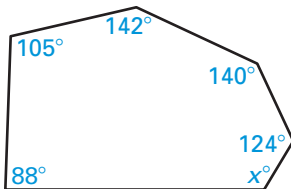**Find the sum of the measures of the interior angles of the indicated convex polygon.**

1. Hexagon **2.** Dodecagon **3.** 11-gon

4. 15-gon **5.** 20-gon **6.** 40-gon

The sum of the measures of the interior angles of a convex polygon is given. Classify the polygon by the number of sides.
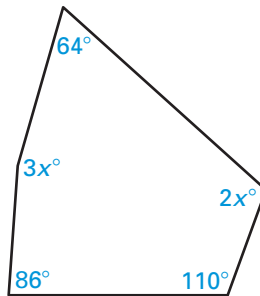
7. 180° **8.** 540° **9.** 900°

10. 1800° **11.** 2520° **12.** 3960°

13. 5040° **14.** 5940° **15.** 8640°

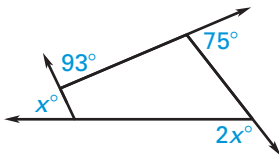**Find the value of x.**

16.

17.

18.
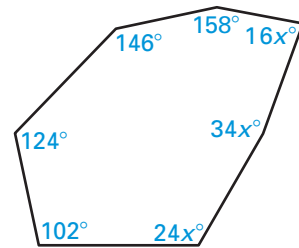
19.

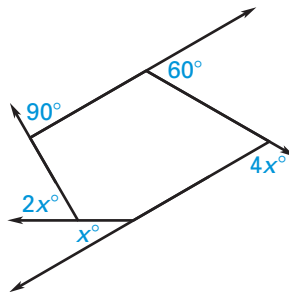**20.**

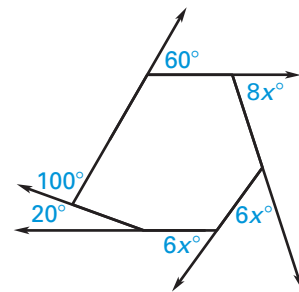**21.**

22. Error Analysis A student claims that the sum of the measures of the exterior angles of a pentagon is greater than the sum of the measures of the exterior angles of a quadrilateral. The student justifies this claim by saying that a pentagon has one more side than a quadrilateral. *Describe* and correct the student's error.

23. What is the measure of each exterior angle of a regular nonagon?

24. The measures of the exterior angles of a convex quadrilateral are 90°, $10x°$, $5x°$, and 45°. What is the measure of the largest exterior angle?

UNIT 5

Exercise Set A *(continued)*

25. The measures of the interior angles of a convex octagon are $45x°$, $40x°$, $155°$, $120°$, $155°$, $38x°$, $158°$, and $41x°$. What is the measure of the smallest interior angle?

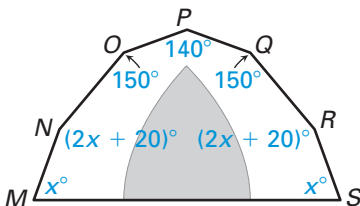**Find the measures of an interior angle and an exterior angle of the indicated polygon.**

26. Regular triangle

27. Regular octagon

28. Regular 16-gon

29. Regular 45-gon

30. Regular 60-gon

31. Regular 100-gon

In Exercises 32–35, find the value of *n* for each regular *n*-gon described.

32. Each interior angle of the regular n-gon has a measure of $140°$.

33. Each interior angle of the regular n-gon has a measure of $175.2°$.

33. Each exterior angle of the regular n-gon has a measure of $45°$.

35. Each exterior angle of the regular n-gon has a measure of $3°$.

36. **Storage Shed** The side view of a storage shed is shown below. Find the value of x. Then determine the measure of each angle.
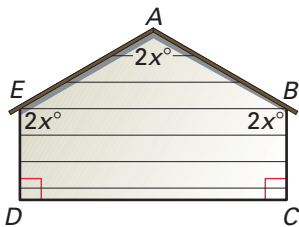
37. **Tents** The front view of a camping tent is shown below. Find the value of x. Then determine the measure of each angle.

38. **Proof** Because all the interior angle measures of a regular n-gon are equal, you can find the measure of each individual interior angle. The measure of each interior angle of a regular n-gon is $\dfrac{(n - 2) \cdot 180}{n}$. Write a paragraph proof to prove this statement.
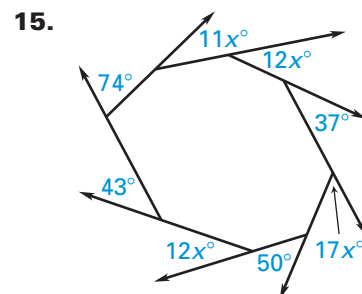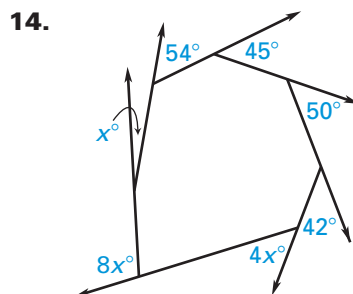
LESSON
5.7

Exercise
Set B

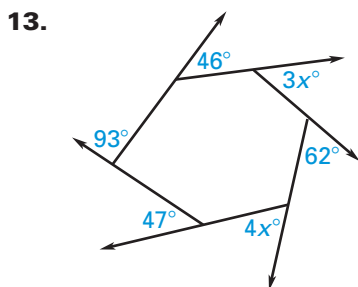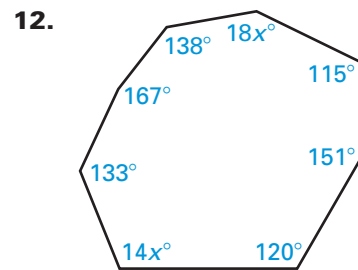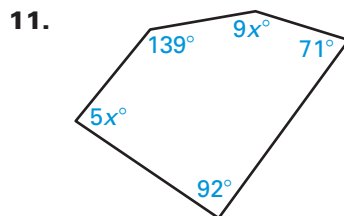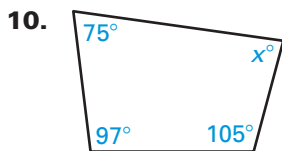MM1G3a   Determine the sum of interior and exterior
angles in a polygon.

Find the sum of the measures of the interior angles of the indicated convex polygon.

1. 21-gon

2. 35-gon

3. 50-gon

The sum of the measures of the interior angles of a convex polygon is given. Classify the polygon by the number of sides.

4. 1440°

5. 3060°

6. 3780°

7. 6480°

8. 8100°

9. 8820°

Find the value of x.

10.

75°
$x°$
97°   105°

11.

139° $9x°$ 71°
$5x°$
92°

12.

138° $18x°$
167°   115°
133°   151°
$14x°$ 120°

13.

46°
$3x°$
93°
62°
47° $4x°$

14.

54°   45°
50°
$x°$
42°
$8x°$ $4x°$

15.

$11x°$ $12x°$
74°   37°
43°
$12x°$ 50° $17x°$

16. What is the measure of each interior angle of a regular nonagon?

17. The measures of the exterior angles of a convex hexagon are 45°, 60°, $x°$, $3x°$, $7x°$, and 90°. What is the measure of the largest exterior angle?

18. The measures of the interior angles of a convex decagon are 150°, 145°, 130°, $34x°$, $35x°$, 135°, 160°, 120°, $30x°$, and $21x°$. What is the measure of the smallest interior angle?

Find the measures of an interior angle and an exterior angle of the indicated regular polygon.

19. Regular heptagon

20. Regular dodecagon

21. Regular 17-gon

22. Regular 50-gon

23. Regular 70-gon

24. Regular 125-gon

UNIT 5

Exercise Set B *(continued)*

In Exercises 25–28, find the value of *n* for each regular *n*-gon described.

25. Each interior angle of the regular *n*-gon has a measure of 165°.

26. Each interior angle of the regular *n*-gon has a measure of 177.6°.

27. Each exterior angle of the regular *n*-gon has a measure of 5°.

**28.** Each exterior angle of the regular *n*-gon has a measure of 12°.

Determine if it is possible for a regular polygon to have an interior angle with the given angle measure. *Explain* your reasoning.

29. 155° **30.** 160° **31.** 175° **32.** 168°

33. Light Fixture The side view of a light fixture is shown below. Find the value of *x*. Then determine the measure of each angle.
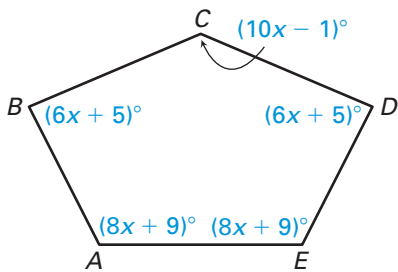
34. Tent The front view of a camping tent is shown below. Find the value of *x*. Then determine the measure of each angle.
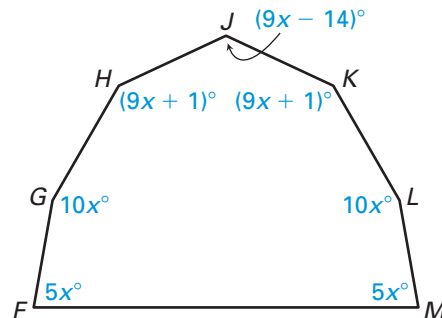
35. Multiple Representations The formula for the measure of each interior angle in a regular polygon can be written in function notation.

  a. Writing a Function Write a function $h(n)$, where *n* is the number of sides in a regular polygon and $h(n)$ is the measure of any interior angle in the regular polygon.

  b. Using a Function Use the function from part (a) to find $h(10)$. Then use the function to find *n* if $h(n) = 156°$.

  c. Graphing a Function Graph the function from part (a) for $n = 3, 4, 5, 6, 7, 8,$ and 9. Based on your graph, describe what happens to the value of $h(n)$ as *n* increases. *Explain* your reasoning.

36. Proof Write a paragraph proof to prove the following statement:

If the measure of each interior angle of a regular *n*-gon is $x°$, then $n = \dfrac{360}{180 - x}$.