

1.4**Perimeter and Area in the Coordinate Plane**

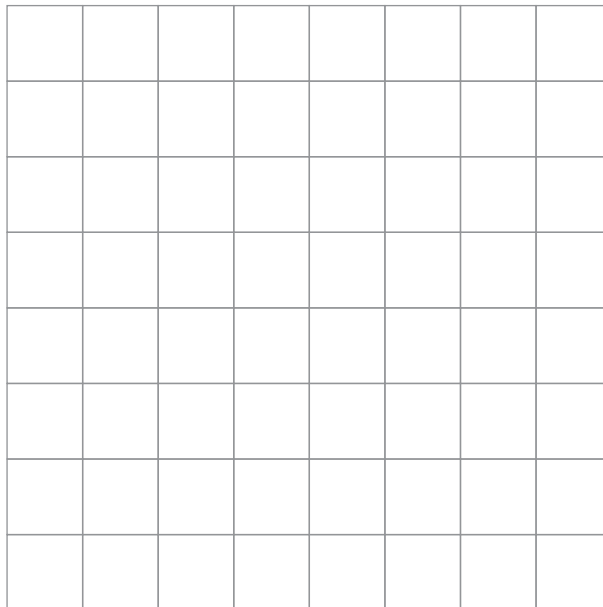
For use with Exploration 1.4

Essential Question How can you find the perimeter and area of a polygon in a coordinate plane?

1 EXPLORATION: Finding the Perimeter and Area of a Quadrilateral

Work with a partner.

- a. On the centimeter graph paper, draw quadrilateral $ABCD$ in a coordinate plane. Label the points $A(1, 4)$, $B(-3, 1)$, $C(0, -3)$, and $D(4, 0)$.



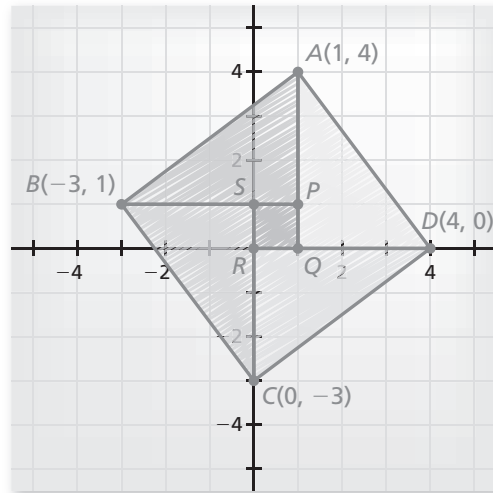
- b. Find the perimeter of quadrilateral $ABCD$.
- c. Are adjacent sides of quadrilateral $ABCD$ perpendicular to each other? How can you tell?
- d. What is the definition of a square? Is quadrilateral $ABCD$ a square? Justify your answer. Find the area of quadrilateral $ABCD$.

1.4 Perimeter and Area in the Coordinate Plane (continued)

2 EXPLORATION: Finding the Area of a Polygon

Work with a partner.

- a. Quadrilateral $ABCD$ is partitioned into four right triangles and one square, as shown. Find the coordinates of the vertices for the five smaller polygons.



- b. Find the areas of the five smaller polygons.

Area of Triangle BPA :

Area of Triangle AQP :

Area of Triangle DRC :

Area of Triangle CSB :

Area of Square $PQRS$:

- c. Is the sum of the areas of the five smaller polygons equal to the area of quadrilateral $ABCD$? Justify your answer.

Communicate Your Answer

- 3. How can you find the perimeter and area of a polygon in a coordinate plane?
- 4. Repeat Exploration 1 for quadrilateral $EFGH$, where the coordinates of the vertices are $E(-3, 6)$, $F(-7, 3)$, $G(-1, -5)$, and $H(3, -2)$.

1.4**Notetaking with Vocabulary**

For use after Lesson 1.4

In your own words, write the meaning of each vocabulary term.

polygon

side

vertex

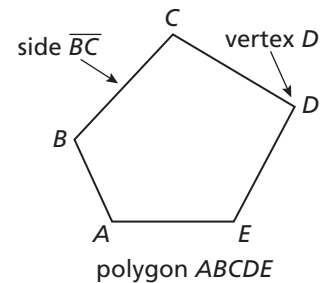
 n -gon

convex

concave

Core Concepts**Polygons**

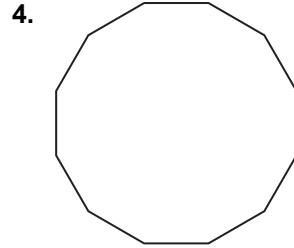
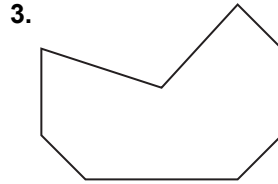
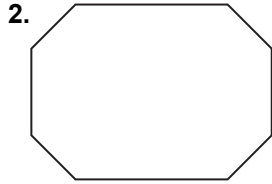
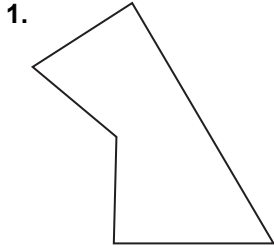
In geometry, a figure that lies in a plane is called a plane figure. Recall that a *polygon* is a closed plane figure formed by three or more line segments called *sides*. Each side intersects exactly two sides, one at each *vertex*, so that no two sides with a common vertex are collinear. You can name a polygon by listing the vertices in consecutive order.

**Notes:**

1.4 Notetaking with Vocabulary (continued)

Extra Practice

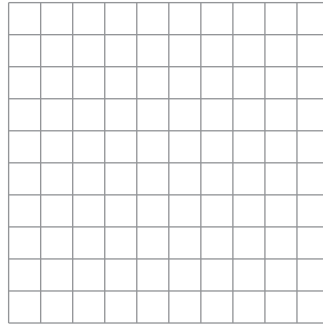
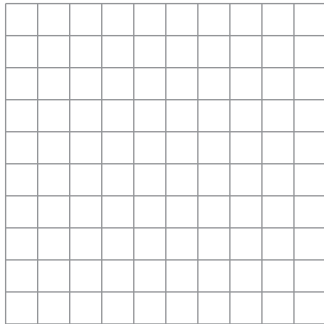
In Exercises 1–4, classify the polygon by the number of sides. Tell whether it is *convex* or *concave*.



In Exercises 5–8, find the perimeter and area of the polygon with the given vertices.

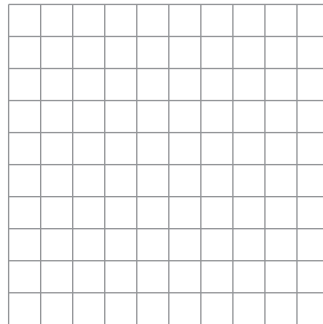
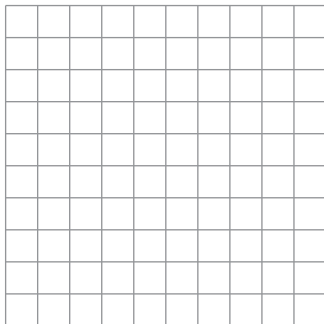
5. $X(2, 4), Y(0, -2), Z(2, -2)$

6. $P(1, 3), Q(1, 1), R(-4, 2)$



7. $J(-4, 1), K(-4, -2), L(6, -2), M(6, 1)$

8. $D(5, -3), E(5, -6), F(2, -6), G(2, -3)$

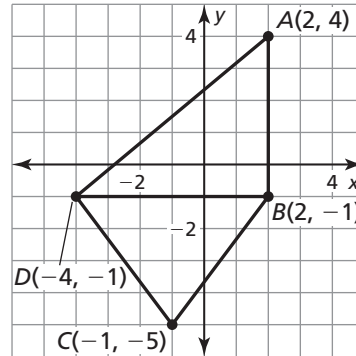


1.4 Notetaking with Vocabulary (continued)

In Exercises 9–14, use the diagram.

9. Find the perimeter of $\triangle ABD$.

10. Find the perimeter of $\triangle BCD$.



11. Find the perimeter of quadrilateral $ABCD$.

12. Find the area of $\triangle ABD$.

13. Find the area of $\triangle BCD$.

14. Find the area of quadrilateral $ABCD$.