

LESSON
1.6**Study Guide**

For use with pages 42–47

GOAL Classify polygons.**Vocabulary**

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 endpoint, so that no two sides with a common endpoint are collinear. Each endpoint of a side is a **vertex** of the polygon.

A polygon is **convex** if no line that contains a side of the polygon contains a point in the interior of the polygon.

A polygon that is not convex is called nonconvex or **concave**.

The term **n -gon**, where n is the number of a polygon's sides, can be used to name a polygon.

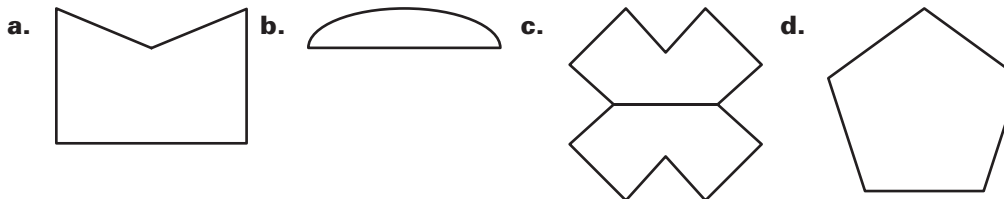
In an **equilateral** polygon, all sides are congruent.

In an **equiangular** polygon, all angles in the interior of the polygon are congruent.

A polygon is **regular** if all sides and all angles are congruent.

EXAMPLE 1 Identify polygons

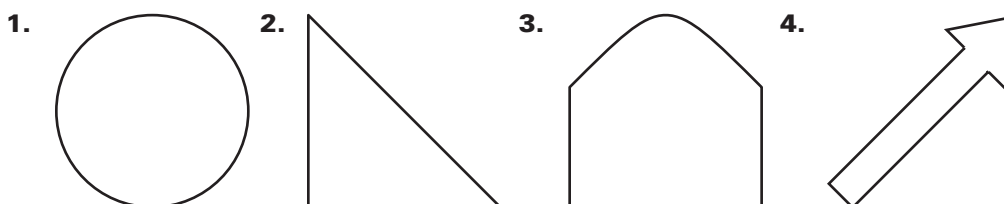
Tell whether the figure is a polygon and whether it is **convex** or **concave**.



- The figure is a concave polygon.
- Part of the figure is not a segment, so it is not a polygon.
- Some segments intersect more than two segments, so it is not a polygon.
- The figure is a convex polygon.

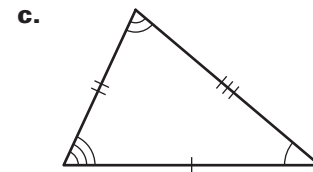
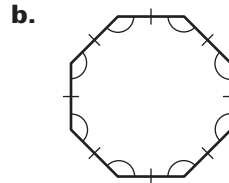
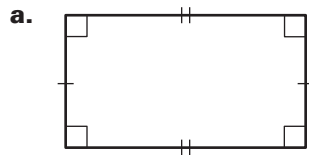
Exercises for Example 1

Tell whether the figure is a polygon and whether it is **convex** or **concave**.



LESSON
1.6**Study Guide** *continued*
For use with pages 42–47**EXAMPLE 2** Classify polygons

Classify the polygon by the number of sides. Tell whether the polygon is *equilateral*, *equiangular*, or *regular*. Explain your reasoning.



- a. The polygon has 4 sides, so it is a quadrilateral. The angles in the interior of the polygon are congruent, so it is equiangular. Not all of the sides are congruent, so it is not equilateral. So, the polygon is not regular.
- b. The polygon has 8 sides. It is equilateral and equiangular, so it is a regular octagon.
- c. The polygon has 3 sides, so it is a triangle. It is not equilateral or equiangular, so it is not regular.

EXAMPLE 3 Find side lengths

The figure shown at the right is a regular pentagon. Find the length of a side.

First, write and solve an equation to find the value of x .
Use the fact that the sides of a regular pentagon are congruent.

$$2x - 1 = x + 3 \quad \text{Write equation.}$$

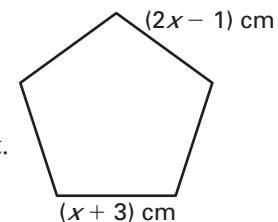
$$x - 1 = 3 \quad \text{Subtract } x \text{ from each side.}$$

$$x = 4 \quad \text{Add 1 to each side.}$$

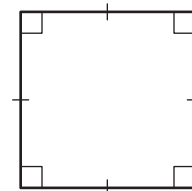
Then find a side length. Evaluate one of the expressions when $x = 4$.

$$2x - 1 = 2(4) - 1 = 7$$

The length of a side of the pentagon is 7 centimeters.

**Exercises for Examples 2 and 3**

5. Classify the polygon by the number of sides. Tell whether the polygon is *equilateral*, *equiangular*, or *regular*. Explain your reasoning.



6. The figure shown at the right is a regular hexagon. Find the length of a side.

