

# Key Concepts

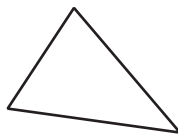
Lessons  
10-4 and 10-5

## Triangles and Quadrilaterals

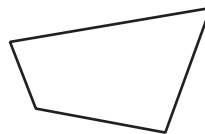
**Objective** Introduce descriptions of several special types of triangles and quadrilaterals, and teach students to classify triangles and quadrilaterals according to their sides or angles.

**Note to the Teacher** *In this lesson your students will learn the names of special triangles and quadrilaterals. The names describe certain properties of the sides or the angles of the figures. The students will then be asked to classify triangles or quadrilaterals according to whether their sides or angles have these properties. Drawing lots of figures on the chalkboard, and having the students draw lots of figures, will enhance their understanding.*

Begin the lesson by discussing the terms *triangle* and *quadrilateral*. Remind the students that a **triangle** is a figure with three sides (or equivalently, with three angles). Indeed, since the prefix *tri-* means *three*, the word *triangle* literally means *three angles*. A **quadrilateral** is a figure with four sides. The prefix *quad-* means *four* and the word *lateral* refers to *sides*, so the word *quadrilateral* means *four sides*. Draw these figures on the chalkboard.



Triangle



Quadrilateral

Now introduce your students to the following terms regarding triangles and quadrilaterals. Remind them that **congruent sides** of a figure are the same length.

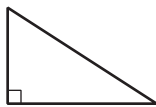
### Triangles

Triangles can be classified by the properties of their *angles*.

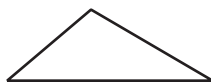
1. An **acute** triangle is one in which all three angles are acute (measure less than  $90^\circ$ ).



2. A **right** triangle is one in which one angle is a right angle (measure equal to  $90^\circ$ ).

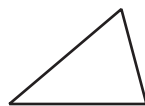


3. An **obtuse** triangle is one in which one angle is an obtuse angle (measure greater than  $90^\circ$ ).

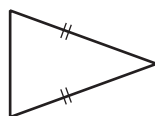


Triangles can also be classified by the properties of their *sides*.

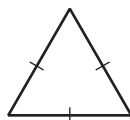
1. A **scalene** triangle is one in which none of its sides are congruent.



2. An **isosceles** triangle is one in which at least two of its sides are congruent.

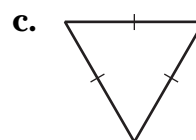
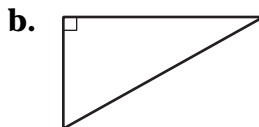
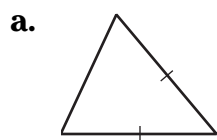


3. An **equilateral** triangle is one in which all three of its sides are congruent.



Now draw several different triangles on the chalkboard and have your students *classify* the triangles, that is, ask them what type of triangles they are according to the definitions given above. Then give students some more examples from the Student Edition to classify by themselves or in small groups. Here are some examples.

**Example 1** Classify each triangle either by its angles or its sides.



**Solution a.** This triangle is *isosceles* since it has two congruent sides. The triangle is also *acute*, because the measures of all its angles are less than  $90^\circ$ .

- b. This is a *right* triangle since it has a right angle. It is also a *scalene* triangle because none of its sides are congruent.
- c. This is an *equilateral* triangle since all three of its sides are congruent. It is also an *acute* triangle since all of its angles measure less than  $90^\circ$ .

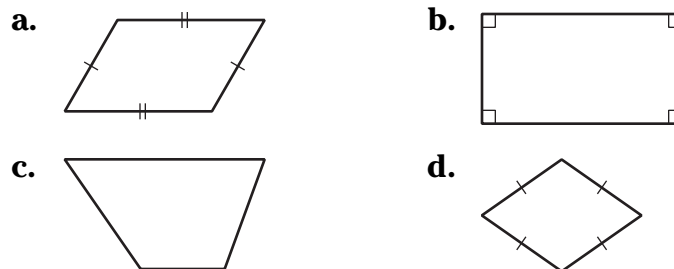
## Quadrilaterals

On the chalkboard, copy the following table which describes five special types of quadrilaterals.

Name of the Quadrilateral	Description
Parallelogram	Quadrilateral whose opposite sides are parallel and congruent.
Trapezoid	Quadrilateral with exactly one pair of parallel sides.
Rectangle	Parallelogram with four right angles.
Rhombus	Parallelogram with four congruent sides.
Square	Rectangle with four congruent sides.

Draw several different quadrilaterals on the chalkboard and have your students classify them using the descriptions given in the table. Then give students some more examples from the Student Edition to classify by themselves or in small groups. Here are a few examples.

### Example 2 Classify each quadrilateral either by its angles or its sides.



- Solution**
- a. This is a *parallelogram* since the opposite sides are parallel. The opposite sides are also congruent.
  - b. This is a *rectangle* since it is a parallelogram whose four angles are all right angles. (It is *not* a square since all four sides are not congruent.)
  - c. This is a *trapezoid* since it has just one pair of parallel sides.
  - d. This is a *rhombus* since it is a parallelogram with all four of its sides congruent. (It is *not* a square since its angles are not right angles.)

