

Lesson 5.6: Properties of Special Parallelograms

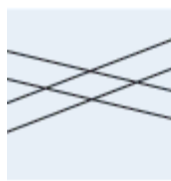
In this lesson you will:

- discover properties of rhombuses and their diagonals
- discover properties of rectangles and their diagonals
- discover properties of squares and their diagonals

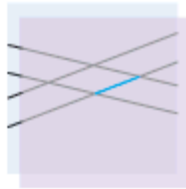
In Lesson 5.5, you investigated parallelograms. In this lesson you will focus on three special parallelograms—rhombuses, rectangles, and squares.

Investigation 5.6.1: “What Can You Draw With the Double-Edged Straightedge?”

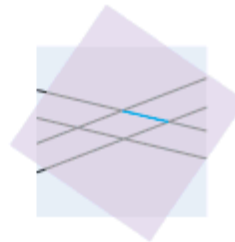
In this investigation you will discover the special parallelogram that you can draw using just the parallel edges of a straightedge.



Step 1



Step 2



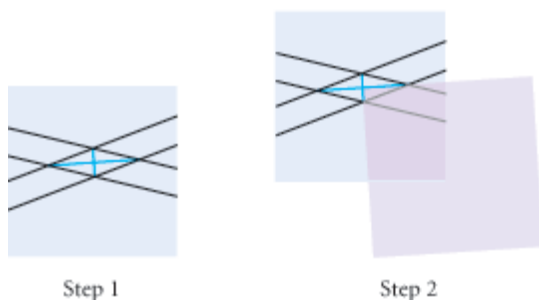
Step 3

- A.) On a piece of patty paper, use your ruler to draw two pairs of parallel lines that intersect each other. (See Step 1’s diagram above.)
- B.) Assuming that the two edges of your ruler are parallel, you have drawn a parallelogram. Place a second piece of patty paper over the first, and copy one of the sides of parallelogram. (See Step 2.)
- C.) Compare the length of the side on the second piece of patty paper with the lengths of the other three sides of the parallelogram. Are all the sides congruent? _____ Therefore, what kind of parallelogram did you draw in part A? _____
- D.) Complete the conjecture below, and add it to your conjecture list.

Double-Edged Straightedge Conjecture (C-48)

If two parallel lines are intersected by a second pair of parallel lines that are the same distance apart as the first pair, then the parallelogram is a _____.

Investigation 5.6.2: “Do Rhombus Diagonals Have Special Properties?”



- A.) Draw in both diagonals of the rhombus you created in the first investigation (like pictured in Step 1 of the diagram above.)
- B.) Use a protractor to measure the angles formed by the intersection of the two diagonals. What is the measure of each of the 4 angles? _____
- C.) Recall that a rhombus is a parallelogram and that the diagonals of a parallelogram bisect each other (C-47). Combine this idea with your observations from part B to complete the conjecture below. Don't forget to continue to add all conjectures to your conjecture list.

Rhombus Diagonals Conjecture (C-49)

The diagonals of a rhombus are _____, and they _____ each other.

- D.) The diagonals and the sides of the rhombus form two angles at each vertex. Fold your patty paper to compare each pair of angles. Are the two angles at each vertex congruent?

- E.) Complete the conjecture below based on your observation from part D.

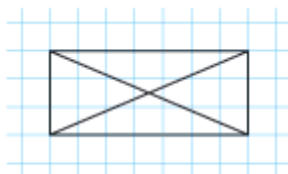
Rhombus Angles Conjecture (C-50)

The diagonals of a rhombus _____ the angles of the rhombus.

Investigation 5.6.3: “Do Rectangle Diagonals Have Special Properties?”



Step 1



Step 2

- A.) Draw a large rectangle (make sure sides are at least 6 cm apart) using the lines on a piece of graph paper as a guide.
- B.) Draw in both diagonals (see Step 2). Compare the lengths of the two diagonals. In addition, recall that a rectangle is also a parallelogram. So its diagonals also have the properties of a parallelogram’s diagonals. Combine these ideas to complete the conjecture.

Rectangle Diagonals Conjecture (C-51)

The diagonals of a rectangle are _____ and they _____ each other.

What happens if you combine the properties of a rectangle and a rhombus? We call the shape a _____, and you can think of it as a regular quadrilateral. So you can define it in two different ways.

A square is an equiangular _____.

Or

A square is a equilateral _____.

A square is a parallelogram, as well as both a rectangle and a rhombus. Use what you know about the properties of these three quadrilaterals to complete the conjecture below.

Square Diagonals Conjecture (C-52)

The diagonals of a square are _____, _____, and _____ each other.

⇒**ASSIGNMENT:** _____