

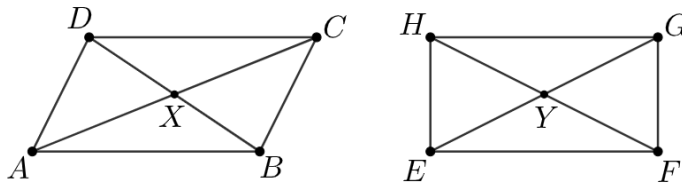
Lesson 2.09

Quadrilaterals & Parallelograms

Geometry GT

Analyze

Here is parallelogram $ABCD$ and rectangle $EFGH$. What do you notice? What do you wonder?



Definitions

Rectangle: a quadrilateral with four right angles

Rhombus: a quadrilateral with four congruent sides

Theorem

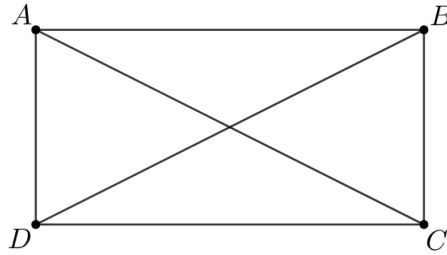
All rectangles are parallelograms

Explore

Conjecture: if a parallelogram has a right angle, then it must be a rectangle. Draw a diagram, and explain why it is true.

Discuss

Conjecture: if the diagonals of a parallelogram are congruent, then it must be a rectangle.



With a partner, work backwards from the conjecture until you are confident that you can prove it is a rectangle using only the given information. Start with the sentence: "I would know $ABCD$ is a rectangle if I knew _____." Then continue with the sentence: "I would know [previous statement] if I knew _____."

Write down each statement below. If you get stuck, go back one statement and try a different path forwards.

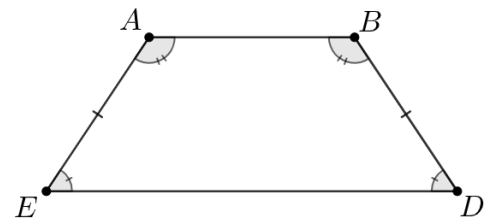
Demonstrate

Write a proof for the previous conjecture.

Practice

1. $ABDE$ is an isosceles trapezoid. Select **all** pairs of congruent triangles.

- A. $\triangle ABE$ and $\triangle DBE$
- B. $\triangle ABD$ and $\triangle DAE$
- C. $\triangle ABE$ and $\triangle BAD$
- D. $\triangle AED$ and $\triangle BDE$
- E. $\triangle EAB$ and $\triangle EDB$



2. Conjecture: a quadrilateral with one pair of sides both congruent and parallel is a parallelogram.

A. Draw a diagram of the situation.

B. Mark the given information.

C. Restate the conjecture as a specific statement using the diagram.

3. In quadrilateral $ABCD$, \overline{AD} is both congruent and parallel to \overline{BC} . Show that $ABCD$ is a parallelogram.

