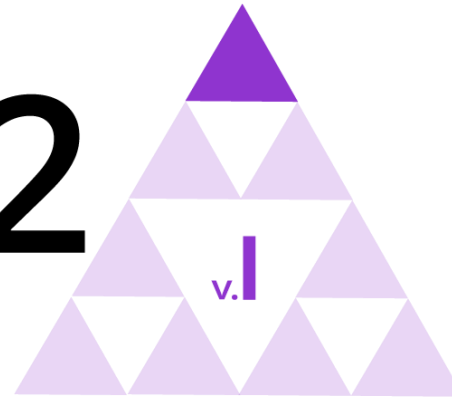


# IM 9–12 MATH



## Unit 2 Congruence



Lesson 12

## Proofs about Quadrilaterals

# Learning Goal

Let's prove theorems about quadrilaterals and their diagonals.

# Geometry



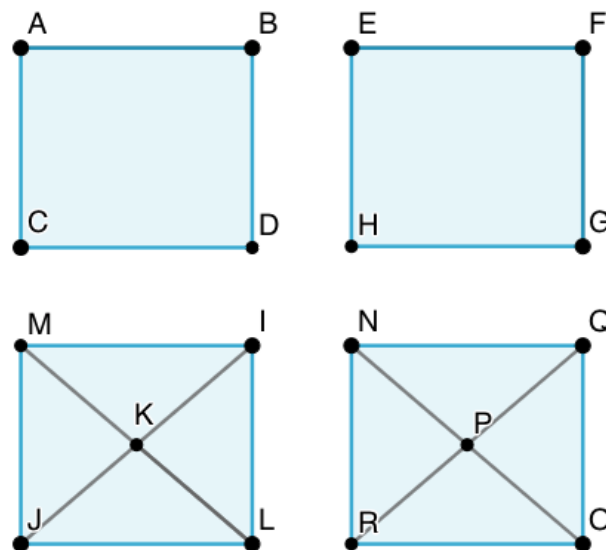
# Play with Parallelograms



## Warm-up

Which statement(s) do you agree with?

- All rectangles are parallelograms.
- All parallelograms are rectangles.

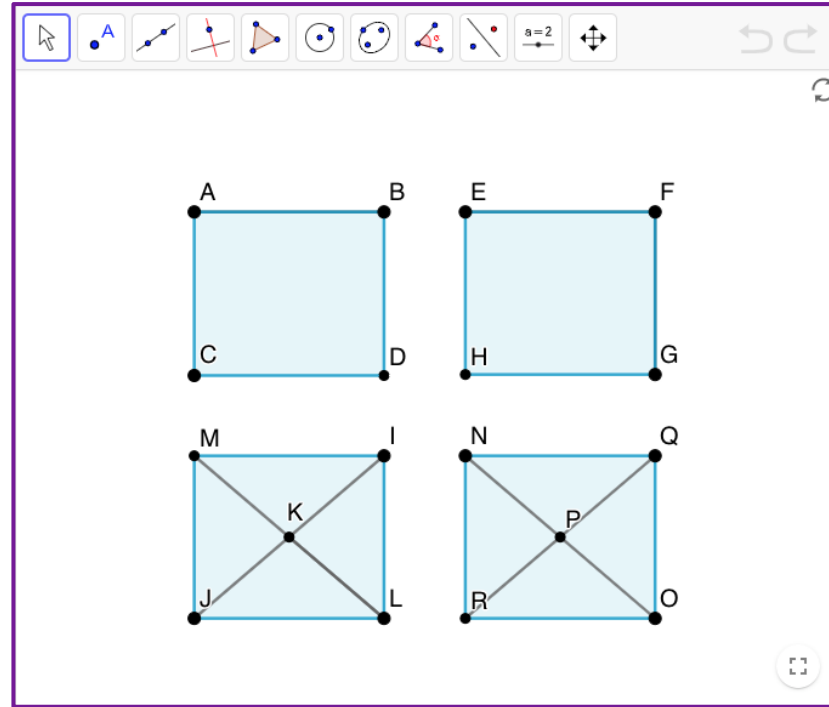


1. Which figures (if any) are always rectangles? Which figures can be dragged to make a rectangle?
2. Which figures (if any) are always parallelograms? Which figures can be dragged to make a parallelogram?

# Play with Parallelograms



## Warm-up





Here are some conjectures:

- All rectangles are parallelograms.
  - If a parallelogram has (at least) one right angle, then it is a rectangle.
  - If a quadrilateral has 2 pairs of opposite sides that are congruent, then it is a parallelogram.
  - If the diagonals of a quadrilateral both bisect each other, then the quadrilateral is a parallelogram.
  - If the diagonals of a quadrilateral both bisect each other and they are perpendicular, then the quadrilateral is a **rhombus**.
1. Pick one conjecture and use technology to convince yourself it is true.
  2. Rewrite the conjecture to identify the given information and the statement to prove.
  3. Draw a diagram of the situation. Mark the given information and any information you can figure out for sure.
  4. Write a rough draft of how you might prove your conjecture is true.



Exchange proofs with your partner. Read the rough draft of their proof. If it convinces you, write a detailed proof together following their plan. If it does not convince you, suggest changes that will make the proof convincing.



Conjecture: All rhombuses are parallelograms.

- Andre: If  $ABCD$  is a rhombus, then it is a parallelogram.
- Clare: If  $ABCD$  has four congruent sides, then the opposite sides are congruent, so it must be a parallelogram.
- Diego: If  $AB \cong BC \cong CD \cong DA$  then  $AB \parallel CD$ .

## Unit 2 • Lesson 12

- I can critique a proof about quadrilaterals.
- I can prove theorems about quadrilaterals.
- I can rewrite a conjecture so it is specific enough to prove.

# Learning Targets

# Geometry





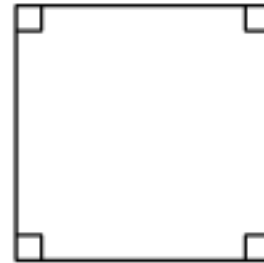
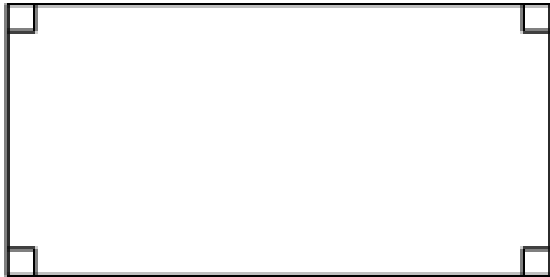


Elena wants to prove that a quadrilateral with 4 right angles must have congruent opposite sides. Explain to Elena how she can use the fact that all rectangles are parallelograms in her proof.



# rectangle

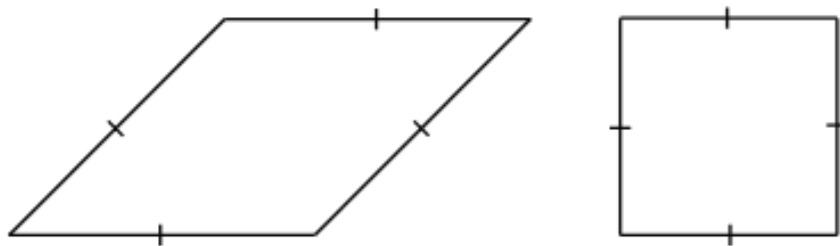
A quadrilateral with four right angles.





# rhombus

A quadrilateral with four congruent sides.





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