Unit 2, Lesson 10

Practicing Proofs

Let's practice what we've learned about proofs and congruence.

10.1 Brace Yourself!

What can you do with the braces and fasteners your teacher will give you?

What different ways can you arrange them?

What different quadrilaterals can you make by changing the braces?

Keep track of your findings.

10.2 Card Sort: More Practice Seeing Shortcuts

1. Your teacher will give you a set of cards that show different figures. Sort the cards into categories of your choosing. Be prepared to explain the meaning of your categories.
2. Sort the cards by rigid vs. flexible figures.
3. State at least one set of triangles that can be proved congruent using the:
   a. Side-Angle-Side Triangle Congruence Theorem.
   b. Angle-Side-Angle Triangle Congruence Theorem.
   c. Side-Side-Side Triangle Congruence Theorem.

Are you ready for more?

This is the John Hancock Building in Chicago. What shape do you think surrounds the diagonal braces? List several ways to test your conjecture.

10.3 Matching Pictures to Proofs

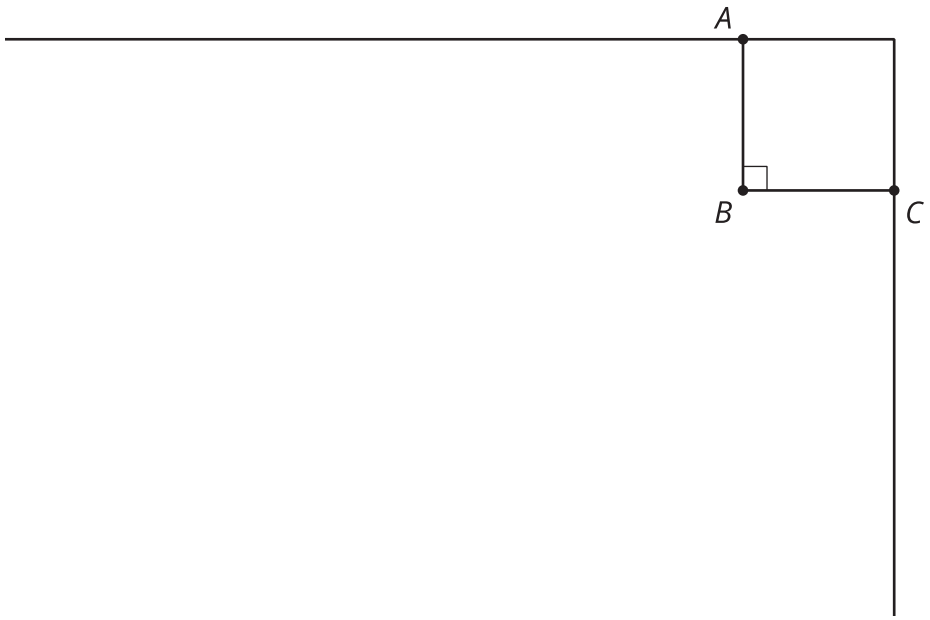
Take turns with your partner to match a statement with a diagram that could go with that proof. For each match you find, explain to your partner how you know it's a match. For each match your partner finds, listen carefully to their explanation. If you disagree, discuss your thinking, and work to reach an agreement.

1. A quadrilateral with perpendicular diagonals that bisect each other is equilateral.
2. If one diagonal of a quadrilateral is the perpendicular bisector of the other, then 2 pairs of adjacent sides are congruent.
3. Opposite angles in an equilateral quadrilateral are congruent.
4. In a parallelogram, opposite sides are congruent.

10.4 Wood Work

1. Watch the video, and record the steps to cut the wooden planks to fit around the beam.
2. Test your steps with your partner.
   - Partner A: Cut 2 pieces of tracing paper to represent the wooden planks. Follow the instructions your partner gives you.
   - Partner B: Read your steps aloud. Adjust your instructions if necessary until the method works.

$\overline{AB} \perp \overline{BC}$



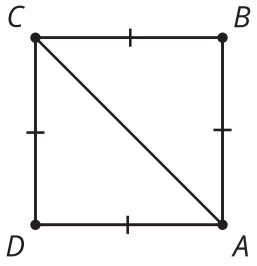
3. Label the diagram and tracing paper so that you can rewrite the conjecture more precisely: "Following these steps will always create 2 pieces that fit together exactly."
4. Write a proof for your precise conjecture.

Lesson 10 Summary

To prove that segments or angles are congruent, we can look for triangles that those segments or angles are part of. Can the triangles be proven congruent? Are the segments or angles corresponding parts of congruent triangles? Does that help prove the conjecture?

To prove that the triangles are congruent, we can look at the diagram and given information. Think about whether it will be easier to find pairs of corresponding angles that are congruent or pairs of corresponding sides that are congruent. Then check if there's enough information to use the Side-Side-Side, Angle-Side-Angle, or Side-Angle-Side Triangle Congruence Theorem.

Here's an example: As part of a proof to show that a quadrilateral with four congruent sides has parallel opposite sides, we need to show that a diagonal splits the quadrilateral into two congruent triangles.



First, sketch a diagram to see what is given, and look for congruent triangles. Since this is about a quadrilateral, adding a diagonal auxiliary line to make triangles will be helpful.

Because all the sides of the quadrilateral are congruent, and the triangles formed by the diagonals share a third side, we can use the Side-Side-Side Triangle Congruence Theorem to prove that triangles ABC and CDA are congruent.