

Objective

Combine geometric shapes to compose a copy of a given shape.

Common Core State Standards

- **1.G.2** Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.

Geometry

Combining Shapes

Giving children the opportunity to combine shapes helps them build important mathematical skills. In this activity, children will be placing shapes on top of other shapes. This will allow them a concrete exploration of how shapes can be combined to form new shapes. The hands-on approach to combining shapes will help children build congruence using the idea that the pieces coincide. This lesson also provides an introduction to tangrams. Familiarity with these shapes will help children work with puzzles in later activities.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** *What shapes did you use to cover the square? How many did you use? Was there more than one way to cover the square?*
- **Ask:** *What shapes did you use to cover the parallelogram? How many shapes did you use? Did you find more than one way to cover the parallelogram?*
- **Ask:** *What shapes did you use to cover the triangle? How many shapes did you use? Say: Describe the shapes you used for both ways you found to cover the triangle.*

Solve It

With children, reread the problem. Have children experiment to find the answer (two triangles). Then have children draw a triangle made out of two smaller triangles and write a sentence telling what shapes Andrew used.

More Ideas

For other ways to teach about combining shapes to copy other shapes—

- Distribute paper bags with Pattern Block squares and triangles to groups of three. Each child should reach into the bag and choose a shape without looking. The child then names the shape and builds it using two or more Tangram pieces. For children who need an additional challenge, introduce the trapezoid Pattern Block and ask them to build the shape with Tangram pieces.
- Have children work in pairs. Name a shape that can be built with Tangram pieces, such as a square, a triangle, or a parallelogram. Ask children to see if they can build the shapes using only triangles, or only squares and parallelograms. For an extra challenge, ask children if they can make a shape with five or six sides out of Tangram pieces.

Formative Assessment

Have children try the following problem.

Draw a line through this shape to make two triangles.



Try It! 20 minutes | Pairs

Here is a problem about combining shapes to compose copies of other shapes.

Andrew's class is building shapes using Tangram pieces. Andrew chose two shapes. He used them to make a square. What two shapes did Andrew use?

Introduce the problem. Then have children do the activity to solve the problem.

Draw a square, a triangle, and a parallelogram on the board. Tell children the name of each shape, and then have them practice saying the shape names. Distribute Tangrams to children.

Materials

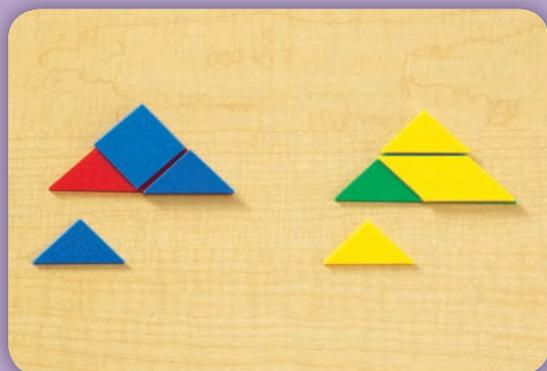
- Tangrams (2 sets per pair)



1. Instruct children to choose a square from their Tangrams. Ask children to use other shapes to cover the square.



2. Invite children to choose a parallelogram Tangram piece from the set. Instruct them to use other shapes to cover the surface of the parallelogram.



3. Have children repeat the activity by covering a large triangle with other Tangram pieces. Tell children that there is more than one way to do this. Ask them to find two different combinations of shapes that they can use.

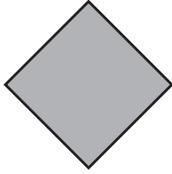
! Look Out!

Children may be confused about the idea of covering up shapes. They may use Tangram pieces that do not fit exactly, causing the top shapes to overlap the bottom or leaving parts of the bottom shape uncovered. If this is the case, remind children that the pieces on top should make a shape that is exactly the same as the bottom shape.

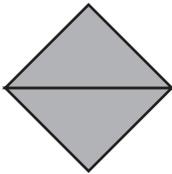


Use Tangram pieces. Make each shape.
Tell what pieces you used. (Check students' work.)

1.



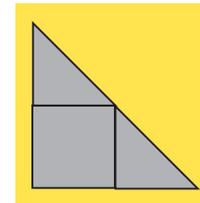
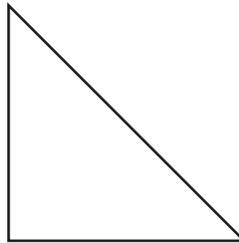
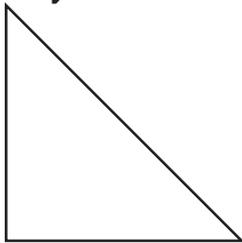
square



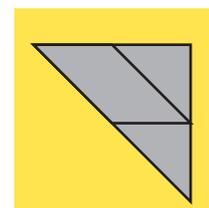
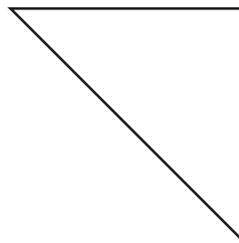
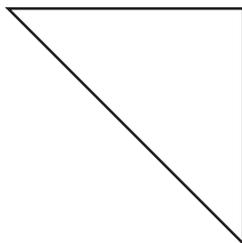
two small triangles

Use Tangram pieces. Match the shape shown on the left using more than 1 piece. Draw the model in the shape on the right.

2. square and 2 other pieces



3. parallelogram and 2 other pieces



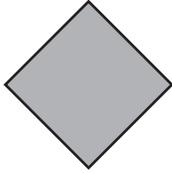
Answer Key

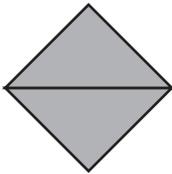
Challenge! How can you tell if two shapes are exactly the same size and shape?

Challenge: (Sample) Place them on top of each other and make sure all of their sides match up.

**Use Tangram pieces. Make each shape.
Tell what pieces you used.**

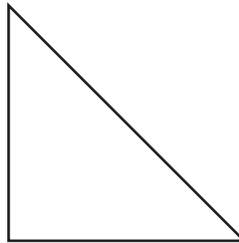
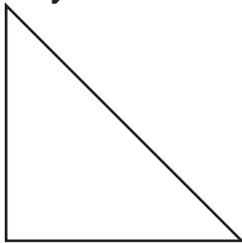
1.



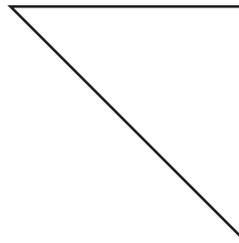
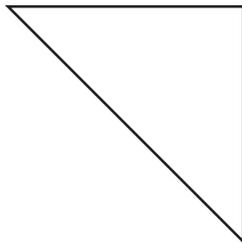


**Use Tangram pieces. Match the shape
shown on the left using more than 1 piece.
Draw the model in the shape on the right.**

2. square and 2 other pieces



3. parallelogram and 2 other pieces



Name _____

Challenge! How can you tell if two shapes are exactly the same size and shape?
