

LESSON 2

Objective

Explore ways of combining different shapes to compose new shapes.

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

Building Shapes

Giving children the opportunity to combine and take apart shapes helps them build several important mathematical skills. Such activities foster spatial reasoning and spatial visualization and deepen children's understanding of geometric properties. Open-ended activities like the one in this lesson encourage the development of problem-solving skills and logical thinking that will be applicable in a variety of experiences both in and out of the classroom environment.

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 make a square? **Say:** Tell me something about your square.
- **Ask:** What shapes did you use to make the parallelogram? **Say:** Tell me something about your parallelogram.
- **Ask:** What shapes did you use to make the triangle? **Say:** Tell me something about your triangle.
- **Ask:** How is the triangle like the square you made? How is it different? How is the triangle like the parallelogram? How is it different? How are the parallelogram and the square alike? How are they different?

Solve It

With children, reread the problem. Then have children draw one way to make each shape out of Tangram pieces.

More Ideas

For other ways to teach about combining shapes to compose new shapes—

- Have children use Snap Cubes® to build composite shapes. Children can build cubes and prisms and combine them to build the composite shapes that you specify.
- Have children use Tangram pieces to play a guessing game. Ask them to build a rectangle. They then build the rectangle out of a square and two triangles or a parallelogram and two triangles. Ask them to build a parallelogram. They should then build a parallelogram out of a square and two triangles, or two triangles. Ask them to build a square. They can use two triangles.

Formative Assessment

Have children try the following problem.

Divide this shape into six equal triangles and color each triangle a different color.



Try It!

20 minutes | Pairs

Here is a problem about combining shapes to compose new shapes.

Juan's class is building shapes using Tangram pieces. Juan's teacher asks him to build a square, a triangle, and a parallelogram. How can Juan build these shapes using Tangram pieces?

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

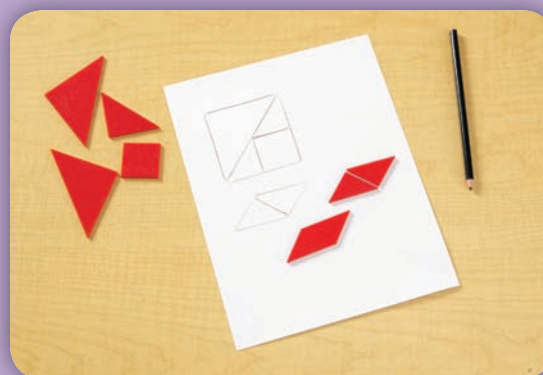
Draw a square, a triangle, and a parallelogram on the board. Review the shape names, giving special attention to the parallelogram, which may be unfamiliar to children. Distribute Tangrams, paper, and pencils to children.

Materials

- Tangrams (1 set per pair)
- paper (1 sheet per child)
- pencils (1 per child)



1. Instruct children to use Tangram pieces to build a square. Have them trace the shapes onto paper to show how they made the square.



2. Instruct children to use Tangram pieces to build a parallelogram. Have children trace the shapes onto paper to show how they made the parallelogram.



3. Have children repeat the activity by making a triangle with the Tangram pieces and tracing the result. Have children share their observations about the new shapes, including similarities and differences between them, and where they can see these shapes in the classroom, playground, school, home, store, and so on.

! Look Out!

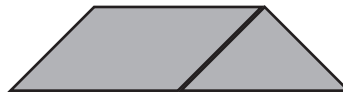
Children may have trouble seeing how Tangram pieces fit together to make other shapes. You may wish to help them by drawing on the board the shape you are asking them to build, then drawing a line to show the silhouette of one smaller shape within it. For example, if you are asking children to build a parallelogram, you may want to draw it on the board and then draw a line to show one of the triangles that it is made of. Then ask children if they can see another triangle in the parallelogram.



Use Tangram pieces to model the shape shown on the left. Name the pieces you used to make the shape.

(Check students' work.)

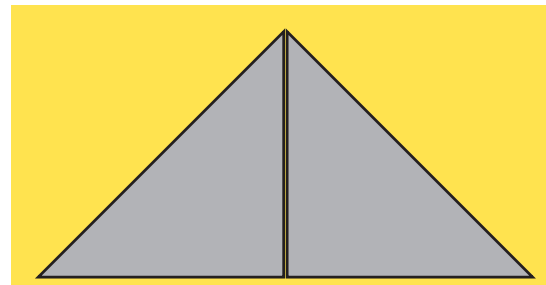
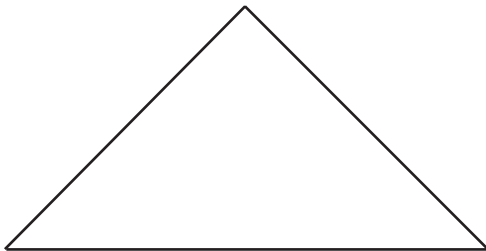
1.



parallelogram and small triangle

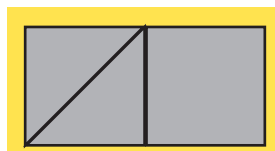
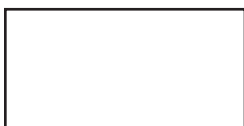
Use Tangram pieces. Make the shape shown on the left using more than 1 piece. Sketch the model in the shape on the right. Name the pieces used.

2.



two triangles

3.



two small triangles and square

Answer Key

Challenge! When you join two Tangram shapes to make another shape, what parts of the shapes touch each other?

Challenge: The sides must line up/touch to form a straight line.

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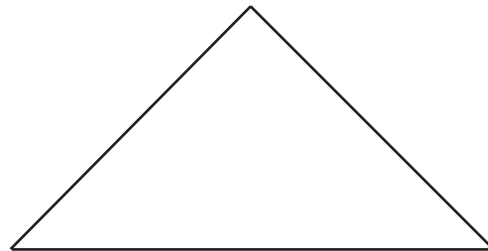
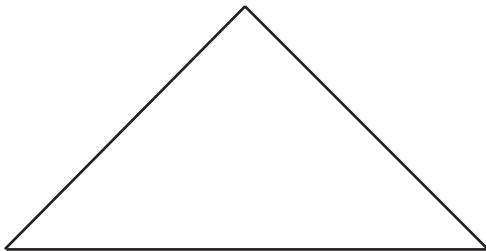
Use Tangram pieces to model the shape shown on the left. Name the pieces you used to make the shape.

1.



Use Tangram pieces. Make the shape shown on the left using more than 1 piece. Sketch the model in the shape on the right. Name the pieces used.

2.



3.



Name _____

Challenge! When you join two Tangram shapes to make another shape, what parts of the shapes touch each other?

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