Each pair needs:
1 set of tangram pieces

29 Professor Relic was digging in the ruins of a lost city when he found a piece of an ancient tile. The piece looked like this:

He knew that this piece had an area $\frac{1}{6}$ the area of the whole tile, which was in the shape of a trapezoid. The piece he found was congruent with the tangram parallelogram. What could the ancient tile have looked like?

Make the tile with tangram pieces. Then draw it on the dot array. More than one solution is possible.

FIND OUT

- **What is the problem about?** Encourage students to restate the problem in their own words.

- **What do you have to find out to solve the problem?** *What the ancient tile looked like*

- **What does the problem tell you about the shape of the whole tile?** *The tile is the shape of a trapezoid. A piece that is congruent with the tangram parallelogram has an area $\frac{1}{6}$ the area of the whole tile.*

CHOOSE STRATEGIES

You can *Use Logical Reasoning* and *Act Out or Use Objects* to help you solve this kind of problem. Use tangram pieces to make the shape.

🍎 TEACHING TIP

Before students draw shapes on the dot array, have them explore the relationships between the tangram pieces. For example, have them measure the side of a small triangle with the side of a large triangle. They will discover that the short side of the small triangle is $\frac{1}{2}$ the short side of the large triangle. They need to understand these relationships in order to draw accurate representations of the shapes on a dot array.

SOLVE IT

1. **Take the tangram piece that is congruent with the piece that the professor found. What part of the total area of the shape does it show?**
   $\frac{1}{6}$ *of the whole*

2. **If the parallelogram has an area of 1 unit, then what other shapes have an area of 1 unit?**
   The square and medium triangle

3. **What pieces put together have an area of 1 unit?**
   2 small triangles

4. **How many units of area does the large triangle have?** *2 units of area*

5. **How many units of area does the trapezoid tile need to have?** *6 units of area*

6. **Try putting together different groups of tangram pieces until you show a trapezoid with an area of 6 units.**

7. **What could the ancient tile have looked like? Draw it on the dot array.**

   Solutions: *Parallelogram plus 1 large triangle, 2 small triangles, square, and medium triangle; or parallelogram plus 2 large triangles and 2 small triangles*
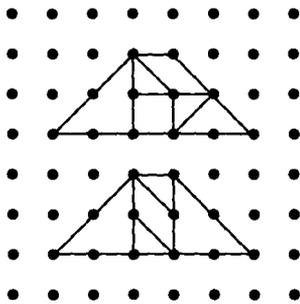

LOOK BACK

Students should read the problem again and check their work. Encourage them to ask themselves, **Did I answer the question that was asked? Does my answer make sense?**

Some teachers like to give students one or more of the Writing Questions (page xx), asking them to explain how they solved the problem.

EXTENSION PROBLEM

Later Professor Relic found another piece of tile, which was congruent with the large tangram triangle. He knew this piece had an area $\frac{1}{3}$ of another whole tile, which was in the shape of a rectangle. What could the second tile have looked like? Make the tile with tangram pieces. Trace it, or draw it on a dot array.

Solution: *Parallelogram, square, medium triangle, 1 large triangle, 2 small triangles*
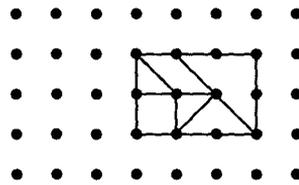
TALK ABOUT IT

Have students talk with a partner or with a group about how they solved the Extension Problem. Students can share their different ways of thinking. Ask questions like, **How did you begin to make the rectangle? What pieces did you start with? What was the most difficult part of solving this problem?**

WRITE YOUR OWN PROBLEM

Have students write similar problems of their own. Students can then exchange the problems and solve them.

PRACTICE

Similar Practice Problems: 81, 82, 83

When you give students a Practice Problem, ask questions such as, **Have you solved a problem like this before? What strategies helped you solve it?**