6

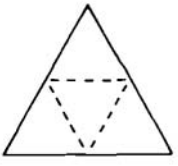
Hidden Figures

Determining Different Ways that Polygons Can Fit Together

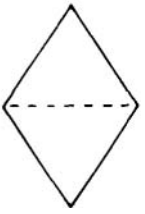
What You Need to Know

As you learned in the previous chapters, polygons are closed plane figures with straight sides. The simplest polygon, called a triangle, has three sides. Rhomboids, squares, and rectangles are examples of polygons with four sides.

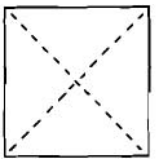
With their straight sides made by line segments, small polygons can fit together to form larger figures of various shapes. Triangles can fit together to form not only larger triangles, but also diamonds, squares, trapezoids, and other multisided figures. such as **pentagons,** which have five sides, and **hexagons,** which have six sides. There are many other possibilities.



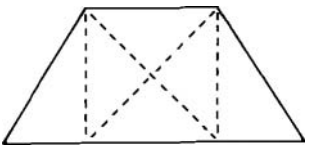
TRIANGLE



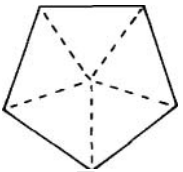
DIAMOND



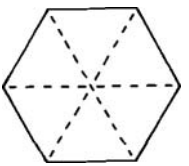
SQUARE



TRAPEZOID



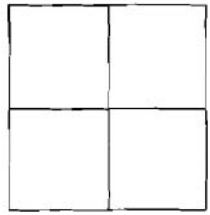
PENTAGON



HEXAGON

Let's Think It Through

How many squares are hidden in the figure?

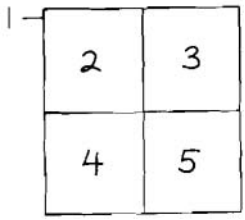


Answer

Think!

- A square has four congruent sides and all its angles are right angles.
- The figure shows one large square made up of four smaller squares.

The total number of squares is five.



Exercises

1. Study the triangle in the figure to answer questions a and b.

Results The square is cut into seven pieces: five triangles—two large, one medium, and two small; one square; and one rhomboid. The time it takes to arrange the pieces into a square varies with each individual.

Why? A **tangram** is a Chinese puzzle made by cutting a square into five triangles, a square, and a rhomboid. The pieces can be arranged to form the original square as well as a great variety of other polygons.

Solutions to Exercises

1a. Think!

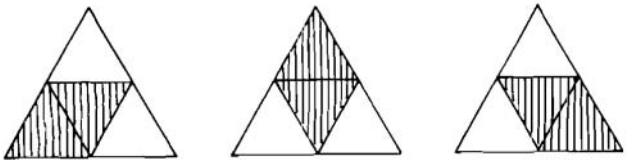
- What is the shape of a triangle? A closed figure with three straight sides.
- The figure shows a large triangle with four smaller hidden triangles inside.

The total number of triangles in the figure is five.

b. Think!

- A diamond shape can be formed by combining two equal-size triangles.
- How many pairs of triangles make up the figure?

The total number of hidden diamonds in the figure is three.



2. *Think!*

- The figure shows one square with nine smaller squares inside.
- Each group of four small squares makes one larger square. How many different groups of four squares are hidden in the diagram? Four.
- $1 + 9 + 4 = 14$

The total number of squares in the figure is *fourteen.*