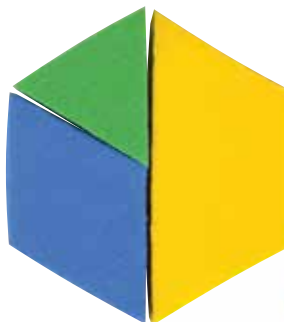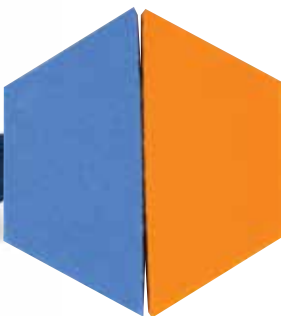# Shaping Up

> You need: pattern blocks, a photocopy of the dodecagon copymaster, a classmate

Here are 3 ways to make a regular hexagon with pattern blocks:

1. What other ways can you find?

2. From this hexagon, you could write the equation:
   $\frac{1}{3} + \frac{1}{3} + \frac{1}{6} + \frac{1}{6} = 1$
   Write the other possible fraction equations for hexagons made with pattern blocks.

1. Here are 4 ways to make a regular dodecagon (a 12-sided polygon) with pattern blocks. Find at least 8 more ways. Draw them as you find them.
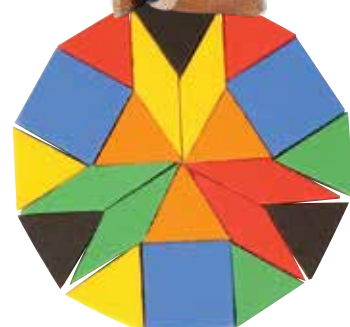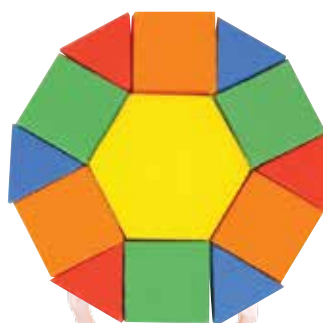
2. a. Write the area of the first dodecagon in question **1** as the sum of 3 different kinds of shape.

    b. Find a way of showing that the area of 1 square pattern block is the same as the area of two 30/150 rhombuses. Explain your method to a classmate.

    c. Rewrite the area of the dodecagon as a sum of squares and triangles only.

    d. Rewrite the area of the dodecagon as a sum of squares and hexagons only.

    e. Show that the area of each dodecagon pictured is the same.

    f. Show that the area of each of your first 4 dodecagons is the same.

The 2 rhombus pattern blocks

60/120

60°

30°

120°

150°

30/150

3. Increase the size of your dodecagon by adding a single ring of squares and trapeziums around the outside.

    a. How has this changed the shape of the dodecagon?

    b. What is its area now, written as a sum of squares and hexagons?
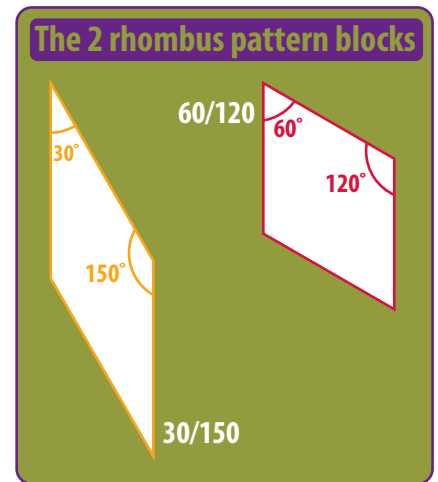
1. a. Is it possible to make a square out of pattern blocks without using the square pattern blocks? Explain your answer.

    b. Can you make a regular octagon or decagon using pattern blocks?

2. Find a way of showing which has the greater area, 6 square pattern blocks or 2 hexagonal pattern blocks. See if you can convince your classmate that you are correct.