

# Pattern Blocks

## Concept Areas

Geometry and logic, process of elimination, finding alternative solutions. Vocabulary: polygons, tessellation, vertex, rhombus, parallelogram, trapezoid, acute and obtuse angles, edge.

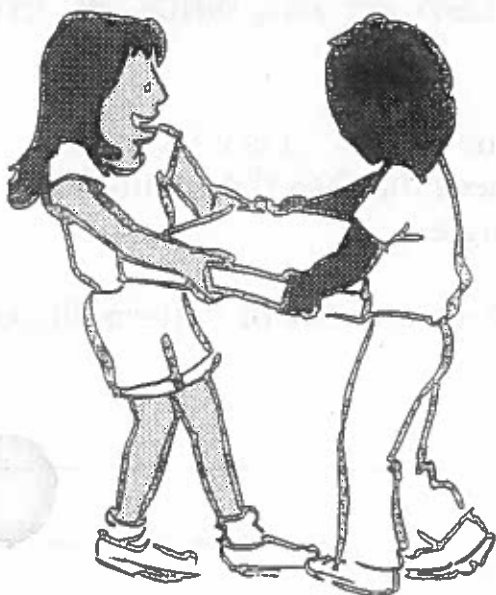
## For Each Group:

- Pattern Blocks, available from educational supply places.

## Description

Each group puts together a pattern based on the clues. Typical clues might be, "the pattern has the same area as seven yellow hexagons," or "there are twice as many triangles as trapezoids." Frequently, unusual words (such as *rhombus* or *tessellation*) get defined on some student's clue.

Most of these problems are *not* good starters because of vocabulary and subtleties in the problems. But students with experience with Pattern Blocks and other cooperative problems should do fine.



On the other hand, this is a good family for students to extend by making up their own problems. Consider having each group make up a pattern with four to eight pattern blocks—then create a cooperative problem for another group.

## Features

These activities give students practice in spatial visualization and in the language of mathematics. They help all students understand more of mathematics by giving the practice both with spatial skills and the language that will help them communicate their understanding.

These problems can be difficult for some students because the clues often give information about a whole class of pieces rather than just one, as in, "every blue rhombus is touching two red trapezoids." That means you have to watch many pieces in the developing pattern instead of just one, and you have to be creative about finding alternative patterns that fit the clues.

## Warning

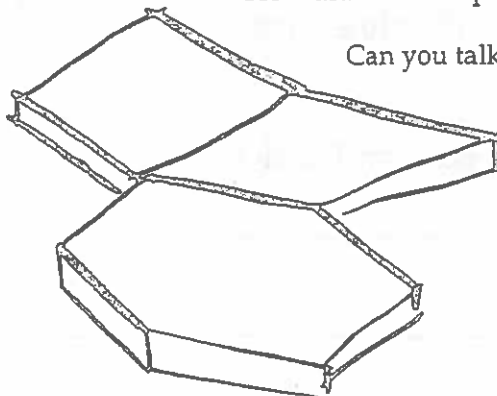
Official Pattern Blocks come in six shapes with six different colors: yellow hexagons, orange squares, green triangles, red trapezoids, and different-shaped rhombuses in blue and white. If you have these shapes but not these colors, you should adapt the problems in this book before trying to use them!

## Possible Debriefing Questions

Did anything surprise you in the way a pattern developed?

How did your group solve these problems?  
How did different people contribute?

Can you talk about different ways we use the word "pattern?" (in a quilt, in a behavior, etc.)



### Left, Right, Middle, End

None of the Pattern Blocks in the row touch each other, and none of the shapes are congruent to any others in the row.

Make the row of Pattern Blocks.



### Left, Right, Middle, End

The pieces at the ends of the row are not quadrilaterals, but there are two Rhombuses (Rhombi?!) in the middle of the row.

Make the row of Pattern Blocks.

### Left, Right, Middle, End

The piece on the left has the largest number of acute angles of any piece. The piece on the right has more obtuse angles than any other.

Make the row of six Pattern Blocks.

### Left, Right, Middle, End

The two pieces on the left end of the row are both regular—they have equal angles in every corner.

Make the row of six Pattern Blocks.

### Left, Right, Middle, End

According to some math books, a rhombus has four equal sides. Though four Pattern Blocks have four sides, only three are rhombuses.

Make the row of Pattern Blocks.

### Left, Right, Middle, End

The trapezoid is next to the piece that has the smallest angles.

Make the row of Pattern Blocks.

## Oh Hexagon

The area of this pattern is the same as four yellow hexagons.

Help your group make this pattern out of Pattern Blocks.

## Oh Hexagon

There are only two kinds of pieces in this pattern—only two colors of Pattern Block.

Help your group make this pattern out of Pattern Blocks.

## Oh Hexagon

There are six Pattern Blocks in this pattern.

Help your group make this pattern out of Pattern Blocks.

## Oh Hexagon

The perimeter of this whole pattern is the same as the total perimeter of four separate green triangles.

Help your group make this pattern out of Pattern Blocks.

## Oh Hexagon

There are the same number of pieces of each color in the figure.

Help your group make this pattern out of Pattern Blocks.

## Oh Hexagon

There are four vertices (corners) in the *interior* of this figure.

Help your group make this pattern out of Pattern Blocks.

## Terry's Triangle

The red and green pieces form two identical small triangles that are parts of Terry's triangle.

Use Pattern Blocks to help your group make Terry's triangle!



## Terry's Triangle

The green piece that's right at the top of Terry's triangle doesn't touch the other green piece.

Use Pattern Blocks to help your group make Terry's triangle!

## Terry's Triangle

There are twice as many blue pieces as green ones, and half as many reds as blues.

Use Pattern Blocks to help your group make Terry's triangle!

## Terry's Triangle

There is a red piece right in the middle on the bottom of Terry's triangle.

Use Pattern Blocks to help your group make Terry's triangle!

## Terry's Triangle

There are a total of eight red, green, and blue pieces in Terry's triangle.

Use Pattern Blocks to help your group make Terry's triangle!

## Terry's Triangle

Each blue piece touches another blue piece.

Use Pattern Blocks to help your group make Terry's triangle!

### Glenda's Pattern

Glenda used only green, blue, red, and yellow Pattern Block pieces.

Help your group make Glenda's pattern!

### Glenda's Pattern

No trapezoid shares a side with another trapezoid, but each trapezoid shares a side with the hexagon.

Help your group make Glenda's pattern!



### Glenda's Pattern

Each trapezoid, triangle and rhombus fit together to form a hexagon shape.

Help your group make Glenda's pattern!

### Glenda's Pattern

Glenda used only one hexagon. The other eighteen Pattern Blocks are evenly divided among other shapes.

Help your group make Glenda's pattern!

### Glenda's Pattern

Each rhombus shares only one vertex with the hexagon and one side with a triangle.

Help your group make Glenda's pattern!

### Glenda's Pattern

You could cover Glenda's pattern with seven yellow hexagons.

Help your group make Glenda's pattern!

## Tessellate!

A tessellation is a pattern of identical shapes that cover a surface with no gaps and no overlaps, like floor tiles.

In this tessellation, each yellow hexagon touches three other yellow hexagons.



## Tessellate!

My tessellation is made up entirely of hexagons, but not all of the hexagons are yellow.

Use Pattern Blocks to make my tessellation!

## Tessellate!

This tessellation uses yellow hexagons, blue rhombuses, red trapezoids, and green triangles.

Use Pattern Blocks to make my tessellation! Since it's infinite, you'll have to make only a part of it.

## Tessellate!

In the tessellation, all of the non-yellow hexagons are made of three colors with the red trapezoid on top. You'll have to pick a direction for "top."

Use Pattern Blocks to make my tessellation!

## Tessellate!

No rhombus touches any other rhombus; no triangle touches any other triangle.

Use Pattern Blocks to make my tessellation!

## Tessellate!

It takes five Pattern Blocks to make one complete part (called a "unit cell") of this tessellation. You can make the whole pattern by repeating unit cells.

Use Pattern Blocks to make my tessellation!