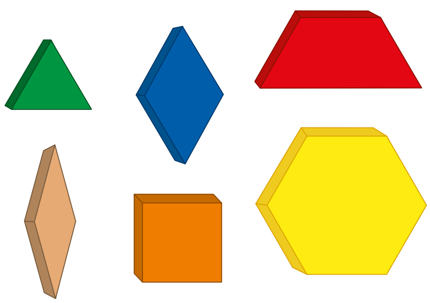
Pattern Block Riddles

OBJECTIVE

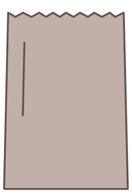
Students will use deductive reasoning while working with fractions and percents as they compare area of geometric figures.

WHAT YOU WILL NEED

Pattern Blocks, about 30 per pair



Paper bags stapled shut, labeled Riddle 1, Riddle 2, Riddle 3, Riddle 4, and Riddle 5, containing the following Pattern Blocks:



Riddle 1: 3 yellow, 2 blue, 2 green

Riddle 2: 2 yellow, 1 red, 6 blue

Riddle 3: 1 yellow, 2 red, 4 blue, 1 green

Riddle 4: 2 blue, 2 green

Riddle 5: 1 red, 1 orange

OVERVIEW

In this activity, students identify hidden collections of Pattern Blocks by solving descriptive clues.

THE BIG IDEA

Riddles, such as the ones in this activity, involve students in using mathematical language to describe relationships and mathematical properties. As they read and interpret the clues, students focus on the attributes of the various shapes and the ways in which the shapes relate to each other. They use mathematical language to express their thoughts and hypotheses.

Students also use logical reasoning as they work through the riddles, adjusting their selection of blocks to fit the various clues. For example, after reading the first two clues in Riddle 2, students may deduce that the bag might contain 1 yellow block and 3 blue blocks (among other blocks), or 2 yellow blocks and 6 blue blocks (among other blocks). The third clue helps students to reason that the latter must be the case, as the area of yellow and blue blocks together must be eight times the area of the red block.

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This activity also affords an opportunity to reinforce the concepts of fractions and percents. The clues incorporate fractions and percents in comparisons based on area. In working with these clues, students see how fractions and percents can be used to describe relationships and provide comparative information.

To solve the riddles, some students may find it easier to work with one clue at a time, selecting combinations of blocks that fit the first clue and adjusting the selection to fit each of the following clues as they work through the riddle. Other students may prefer to read through the entire riddle and search for combinations of blocks that seem to satisfy all of the clues, verifying their solution by checking the final combination against each clue.

For a variety of reasons, some students may find some riddles more difficult to solve than others. For example, the fact that Riddles 1 and 4 do not specify the number of blocks in the bag may make some students feel these riddles are tricky. Students who are not yet comfortable with the concept of percent may find Riddle 3 to be difficult since the main clues both involve percents. Some students may find Riddle 5 to be challenging especially if they limit their conception of a hexagon to only regular hexagons. These students may need to be reminded that any six-sided polygon is a hexagon. To solve Riddle 5, students will also need to remember that the longest side of the trapezoid block is twice as long as the sides of the other Pattern Blocks.

Most students enjoy solving riddles and explaining how they solved them. Their explanations often provide clues to the ways that they think and reason. The development of these deductive reasoning skills is important in students' growth as problem solvers.

1 INTRODUCTION

- Hide one red, one blue, and three green Pattern Blocks in a bag or behind your back.
- Tell students you have hidden some Pattern Blocks. Explain that you will give clues so they can figure out what blocks you have hidden.
- Present the sample riddle below, one clue at a time. After each clue, ask students what they know about the solution so far.

  Sample Riddle

  I have hidden 5 Pattern Blocks.

  The three smallest blocks exactly cover the largest block.

  One of the blocks covers two-thirds of the largest block.

- After students have given their solutions and explanations, reveal your Pattern Blocks.

2 ON THEIR OWN

Students will complete the On Their Own. During this time, the teacher's role is to:

- ask probing questions to guide and extend
- record student thinking
- record student conversation that promotes collaboration

Use the information gathered to inform the Math Talk.

3 MATH TALK

Use prompts such as these to promote class discussion:

- What discoveries did you make while solving the riddles?
- How did you go about solving the riddles?
- Do you think your solution for each riddle is the only possible solution? How can you prove that?
- Was there a riddle that was especially hard to solve? Which one, and why?

4 EXTENSION

- Have students work with partners to write their own Pattern Block riddles. Suggest they first choose the blocks and then make up clues that can lead others to discover their combination of blocks. Students could write their clues on a 3 × 5 card and clip the card to a paper bag containing the blocks. Challenge students to write the fewest number of clues necessary for their riddle. You may wish to limit the number of blocks students may use.
- Challenge students to write Pattern Block riddles that have multiple solutions.

Pattern Block Riddles

ON THEIR OWN

Can you solve these riddles and figure out what Pattern Blocks are in the bags?

1. Each of the riddles below contains clues to Pattern Blocks hidden in different paper bags.

2. Work with your partner to solve each riddle. Record your solutions.

Riddle 1

The area of all the blocks in the bag together is the same as the area of 24 green triangles. Three of the blocks together make up 75% of the total area. The green blocks cover one-half as much area as the blue blocks.

Riddle 2

There are 9 blocks in the bag. The area covered by the yellow blocks is equal to the area covered by the blue blocks. The area covered by the red block is one-eighth the area covered by the yellow and blue blocks combined.

Riddle 3

There are 8 blocks in the bag; 50% are blocks that would each cover one-third of the largest block; 25% are blocks that would each cover one-half of the largest block. The bag contains red, blue, green, and yellow blocks.

Riddle 4

The blocks in the bag can be arranged to cover a yellow hexagon. They can also be arranged to make a parallelogram. There are only two colors of blocks in the bag. There are no red blocks.

Riddle 5

There are 2 blocks in the bag. The blocks can be arranged to make a hexagon. This hexagon has two right angles. The perimeter of this hexagon is 7 units (1 unit = the length of a side of a green triangle).

PATTERN BLOCK RIDDLES

A

Can you solve these riddles and figure out what Pattern Blocks are in the bags?

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PATTERN BLOCK RIDDLES

B

Riddle 3

There are 8 blocks in the bag; 50% are blocks that would each cover one-third of the largest block; 25% are blocks that would each cover one-half of the largest block. The bag contains red, blue, green, and yellow blocks.

Riddle 4

The blocks in the bag can be arranged to cover a yellow hexagon. They can also be arranged to make a parallelogram. There are only two colors of blocks in the bag. There are no red blocks.

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