PATTERN BLOCK TOY FACTORY

NUMBER • GEOMETRY

- Counting
- Comparing
- Money
- Addition
- Multiplication

Getting Ready

What You'll Need

Pattern Blocks, 10-12 red, blue, yellow, and green per child

Toy Catalog, page 94

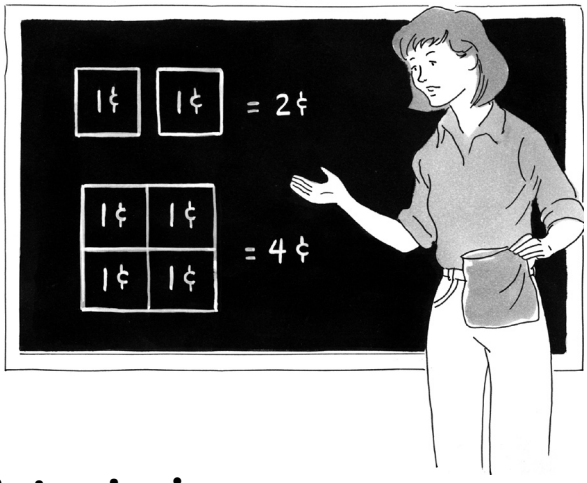
Counters or play money (optional)

Crayons

Overview

Children use Pattern Blocks to design toys. Given the monetary value of the green triangle, red trapezoid, blue parallelogram, and yellow hexagon, children then find the total cost of their designs. In this activity, children have the opportunity to:

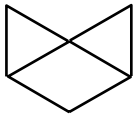
- compare and combine numerical quantities
- work with money concepts
- use proportional thinking
- recognize the size relationships among different geometric shapes



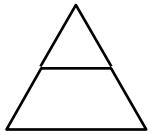
The Activity

In On Their Own, *prices could be scaled up for older children.*

Introducing



- Arrange and display a blue parallelogram and two green triangles, as shown. Ask children to pretend that this is a Pattern Block design for a toy. Invite them to say what the toy could be.
- Ask children to suppose that when you buy a toy, its price is based only on its size. Have children discuss how much this Pattern Block toy might cost if one triangle costs 1¢.
- Establish that each triangle would be 1¢ and the blue parallelogram would cost 2¢ because it is twice the size of the triangle. Therefore, the toy would cost 4¢.

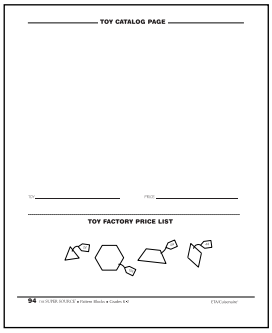


- Invite volunteers to explain how, if a green triangle costs 1¢, they would price this design for a clown's hat.
- Establish that since the triangle is worth 1¢ and the trapezoid holds three green triangles, the trapezoid will cost 3¢ and the clown's hat will cost 4¢.

On Their Own

Pretend you are designing a Pattern Block toy for a toy company's catalog. If you know how much each kind of a block costs, can you figure out the cost of the toy?

- Work with a partner. Each of you use 3 to 6 Pattern Blocks to create a new toy that will be shown in the toy factory's catalog. Make sure the blocks lie flat.
- Each of you trace the shape of your toy on your Toy Catalog page. Then color in the separate blocks.
- Write down the name of your toy.
- Now use the price on the bottom of the Toy Catalog page to help you to find out how much your toy costs. Write down that price.


TOY CATALOG PAGE

TOY _____ PRICE _____

TOY FACTORY PRICE LIST

The Bigger Picture

Thinking and Sharing

Ask for volunteers to share their Toy Catalog pages with the class. Post these worksheets so that everyone can see them. Ask the volunteers to tell how much each toy picture is worth.

Use prompts like these to promote class discussion:

- What strategy did you use to find the cost of the toy?
- Could anyone else use a different strategy to find the cost of the same toy?
- Which toy is the most expensive? Why do you think so?
- Which toy is the least expensive? Why do you think so?

Writing

Have children explain how, if they knew the price of the green triangle, they would be able to find the cost of any toy design that used green triangles, blue parallelograms, red trapezoids, and yellow hexagons.

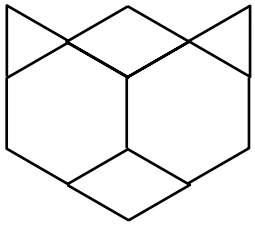
Extending the Activity

1. Have the children make a graph of their designs, grouping them by cost, type of toy, or any attribute they find interesting.
2. Have children sort the designs by those less than 5¢, those exactly 5¢, and those worth more than 5¢. What conclusions can children draw?

Teacher Talk

Where's the Mathematics?

Listening to the strategies that children use to figure the total cost of their toys gives you an opportunity to assess the sophistication of their computation skills. For example, children may approach this problem of finding the cost of this "toy" in several ways:



One child might simply add up the prices shape by shape: 2¢ + 12¢ + 4¢ + 4¢ + 12¢ + 2¢ = 36¢. Another may group the shapes into pairs of triangles (4¢) plus pairs of parallelograms (8¢) plus pairs of hexagons (24¢), and then add these prices for a total of 36¢. A third child might physically or mentally convert some or all of the shapes to triangles and see 18 triangles at 2¢ each for a total of 36¢. Yet another child might see that the triangle-hexagon-parallelogram pattern has been repeated and double the 18¢ to get 36¢.

Using the question, "Could anyone else use a different strategy to find the cost of this same toy?" challenges children to focus on the problem-solving strategy rather than the answer. Children are helped to develop better mental math skills when they can see that there are many approaches to solving a problem.

3. Let children investigate both the fewest and the greatest number of Pattern Blocks needed to make a design worth exactly 8¢.
4. Ask children to change the value of the green triangle, then find the values of the other three blocks and the value of their toys.

If you decide to do the lesson extension in which children change the price of the Pattern Blocks, making up tables to compare how the prices have changed can contribute to the idea of proportional thinking—especially for older children. For example, the first column below shows the values when the original cost was 2¢ for a triangle. The second column shows that if the cost of the triangle were doubled, all of the values double. The third column could either be compared to the original column, in which case, everything has increased by a factor of 4, or it could be compared to the second column, in which case, everything has doubled. Children can establish new costs and make predictions about the values that will fill the rest of the chart, then verify their predictions with the Pattern Blocks.

	orig. cost	new cost	new cost
triangle	2¢	4¢	8¢
parallelogram	4	8	16
trapezoid	6	12	24
hexagon	12	24	48
my toy	?	?	?

That two different designs can have the same value (area) but look different is an important mathematical concept. While finding the value of various toys, children can notice that some have the same value, but will not readily observe that they have the same area, especially if the toys were composed of different Pattern Blocks. Some children, however, may conclude that the toys with greatest value also have the greatest area.