HALF AND HALF

NUMBER • LOGIC

- Counting
- Comparing
- Estimation
- Area
- Fractions

Getting Ready

What You'll Need

Color Tiles, 12 of 1 color and 12 of another color per pair

Half and Half outlines, 1 set per pair, pages 93-94

Crayons

Overhead Color Tiles and/or Color Tile grid paper transparency (optional)

Overview

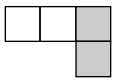
Children predict whether or not the outlines of various shapes can be filled with an equal number of Color Tiles of two different colors. They use Color Tiles to check their predictions, then create addition sentences to describe their results. In this activity, children have the opportunity to:

- predict and count
- discover that there are many ways to show one half
- explore how the concept of one half is linked to various arithmetic operations

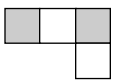
The Activity

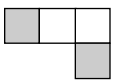
Introducing

- Display this shape consisting of two yellow and two blue Color Tiles.



- Ask children to tell what fraction of the shape is yellow and what fraction is blue. Have them explain why they think as they do.
- Determine that the shape is half yellow and half blue because the number of yellow tiles is equal to the number of blue tiles. Tell children that a number sentence that could be used to describe the tiles in this shape is 2 + 2 = 4.
- Display these shapes. Establish that, even though the position of the tiles in these shapes differ, since they all have an equal number of yellow and blue tiles, they can all be described with the number sentence 2 + 2 = 4.



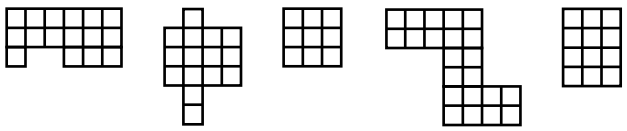


- Arrange three yellow and two blue Color Tiles, and ask whether this shape is half yellow and half blue.
- Establish that the shape does not show halves because there are more yellow tiles than blue tiles. Elicit that a number sentence to describe the tiles in the shape could be 3 + 2 = 5.

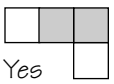
On Their Own

Which of these shapes can be covered with Color Tiles so that half of the shape is 1 color and half is another color?

- Work with a partner. Each of you choose a different Color Tile and gather 12 tiles of that color. You will need shape outlines that look like these:



- Look at 1 shape at a time. Predict whether or not you and your partner will be able to cover the shape so that it has equal numbers of both of your colors. Write "yes" or "no" below the shape.
- Now use your Color Tiles to check your prediction.
- Write a number sentence that tells how many tiles of each color you used and how many tiles it took to cover the shape.
- Color the shape to show where you placed your tiles.
- Choose another shape and repeat these steps.
- Be ready to talk about what you discovered.



Yes
2 + 2 = 4

No
2 + 3 = 5

The Bigger Picture

Thinking and Sharing

Invite pairs of children to share and compare their results and their strategies.

Use prompts such as these to promote class discussion:

- Can you tell just from looking at a shape whether you will be able to cover it equally with tiles of two different colors? If so, how?
- How did you check to see if you had "half and half?"
- As you worked, did you change strategies for predicting or checking? If so, tell what you did.
- What did you notice about the addition sentences as they described the different results?

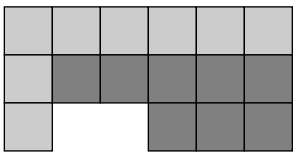
Extending the Activity

1. Have children make their own shapes on 1-inch grid paper for other children to check to see whether they can be covered with the same number of tiles of each of two colors.
2. Create shapes without the grid lines and challenge children to predict whether or not the shapes can be covered "half and half" with Color Tiles.
3. Ask children to try to cover shapes with equal numbers of three different colors of tiles.

Teacher Talk

Where's the Mathematics?

The task of determining whether or not a shape can be filled equally with tiles of two colors connects many mathematical concepts. Finding half of a number is the same as dividing that number by two. Seeing that a shape that contains ten squares that can be covered with five red tiles and five yellow tiles is another way of saying that ten squares may be divided into two equal groups of five. The notion of equal groups first appears when children learn the addition facts known as doubles, that is, 1 + 1, 2 + 2, 3 + 3, 4 + 4, 5 + 5, and so on.

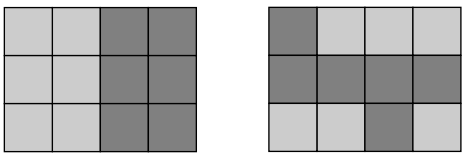


The number sentence that the children would be asked to write for the shape shown above would be 8 + 8 = 16, which comes from this family of doubles facts. These doubles form the basis for the first multiplication facts that children learn—multiplying by two. So, this simple task of covering a shape with tiles of two colors links addition, multiplication, division, and fractions.

Children may realize that the shapes that could be covered equally by two colors contain an even number of squares. Those that could not be covered in this way have an odd number of squares. The concept of odd and even numbers can be a difficult one for some children to grasp, and this visual representation of halves may make this concept understandable. With repeated visitations, children begin to discover that even numbers are those that can be divided into two equal-sized groups, and odd numbers are those that cannot. This approach, whereby children construct their own understanding, stands in sharp contrast to the traditional way, in which children are told that even numbers end in 2, 4, 6, 8, and 0 and odd numbers end in 1, 3, 5, 7, and 9.

Children use different strategies for checking their work. Some may guess and check by putting down some tiles of one color and then filling in the remaining squares with the other color and counting to see if an equal number of each color was used. Others may take turns placing a red tile, then a yellow, then a red, and so forth until the shape is covered. They may be aware that if each partner had an equal number of turns, then the shape must have been covered equally by each color. Other children may alternate tile colors until they fill up the shape, then count how many of each tile were placed on the shape. Still others may alternate placing tiles and then compare the number of unused tiles in each of their piles. If the number of unused tiles is equal, the shape was covered "half and half."

Some children may think that a color does not represent one half unless tiles of the same color are touching. For example, children who think this way would say that the rectangle on the left shows one half but that the rectangle on the right does not.



The ease with which Color Tiles may be rearranged makes it easy for a child to move the tiles in the rectangle on the right and reconfigure them to look like the rectangle on the left. Although the configuration of the tiles in each rectangle is different, the number sentences for the rectangles are identical: 6 + 6 = 12. Combining these ideas may help broaden a child's understanding of the concept of one half.

As children find different ways to show halves, they have the opportunity to learn, demonstrate, and apply some of the basic concepts of fractions: that a fraction is composed of a number of parts that are equal in size and that the fraction used to name a part of a shape does not depend upon the absolute size of the shape.

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