Fractions with Origami

Grade Levels

This activity is intended for grade 3.

Common Core Standard(s)

3.NF.A.1 - Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.

Objectives and Topics

Students work with paper squares to fold, shade, and label equal parts of a whole to show the same fraction in different ways. Students learn to focus on the area of the parts rather than the count of the parts when using the area model for fractions.

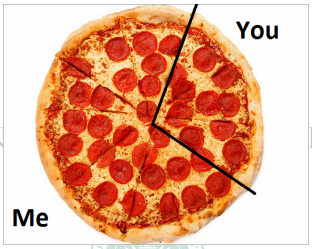
Materials and Resources

- origami paper (enough for 2 sheets per student)
- colored pencils

Introduction and Outline

Attention Grabber

Invite one volunteer to come to the front. Tell this volunteer that you have a pizza and that you are going to giving him one-half of it. Show both the volunteer and the class how you decided to split the pizza:



Ask, Is this what you expected when I said one-half? Why or why not?

Activity

- Distribute one sheet of origami paper to each student. Give the following instructions while modeling.

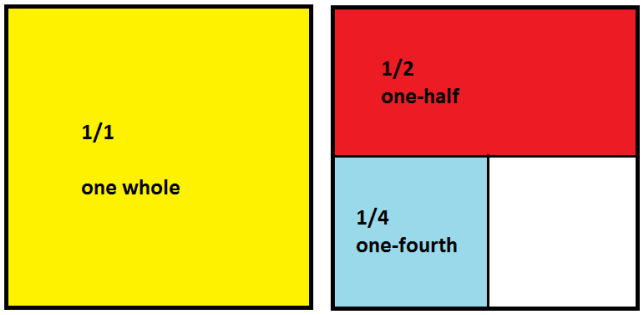
  Step 1 Write "1/1 = one whole" on the colored side.

  Step 2 Fold the sheet in half so that white is on the outside. Lightly color one of the white sides red, and write "1/2 = one-half."

  Step 3 Fold again in half so that white is on the outside. Lightly color one of the white sides blue, and write "1/4 = one-fourth."

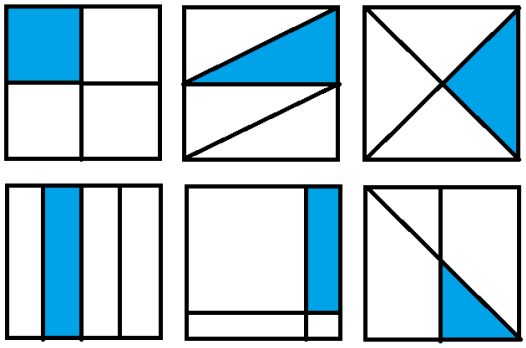
  Step 4 Unfold the piece of paper.

  Emphasize that if there is a 1 on top as the numerator, then whatever number is on the bottom as the denominator, it takes that many "equal parts" to make a "whole." For example, you need four 1/4 pieces to make one whole.



- We have just demonstrated one way of showing one-fourth. Invite two volunteers to each fold a square a different way and shade it to show one-fourth. Have students justify that their shaded piece is one-fourth by showing how their piece can be repeated four times to make the original whole.

- Project the following diagrams and ask, Do these diagrams show one-fourth? Emphasize that the area, and not the count of the pieces, should be the focus for making the decision. Remind students that the count is only important when working with sets of objects.



- Distribute another sheet of origami paper to each student. Instruct the students to fold and shade them in different ways to show one-eighth. Move from group to group and encourage them to find as many different ways as possible to fold and shade a square into eighths. Emphasize that they need to fold the squares in different ways rather than just shading different parts that have been folded in the same way. Discuss both examples and non-examples the students create. If necessary, fold and mark a piece of paper so that it shows eight sections that are not equal in area, and ask students to explain why the sections are not eighths.
- Display these squares that previously demonstrated one-fourth and ask, Is there a way to use these folds to make one-eighths? Prompt them by asking, What do you know about the relationship between one-fourth and one-eighth? How can we show one-eighth if we have one-fourth? Explain that one-eights can be make by folding/dividing the one-fourths in half.