SCAFFOLDING TASK: EXPLORING FRACTIONS

Adapted from NCTM Illuminations
Suggested Time for Task: 2 class periods

STANDARDS FOR MATHEMATICAL CONTENT

MCC3.NF.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*.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Before the activity, be sure the children understand the concept of equal parts. Use pieces of different shaped paper (piece of construction paper, coffee filter, 8 ½ inch square cut from a piece of copy paper, 1/2 sheet of copy paper cut vertically, etc.) to demonstrate folding into equal-sized pieces. For some of the students to understand "equal-sized" you may have to cut and match the pieces, demonstrating that they are the same size. The use of different models, such as fraction bars and number lines, allows students to compare unit fractions and to reason about their sizes.

ESSENTIAL QUESTIONS

- What is a fraction?
- How can I represent fractions of different sizes?
- What relationships can I discover about fractions?
- What does the numerator of a fraction represent?
- What does the denominator of a fraction represent?

MATERIALS

- Exploring Fractions task sheet
- 9" x 12" sheets of paper in six different colors (cut into 1" x 12" strips) Each child will need 6 strips, one of each color.
- Scissors
- File folder (1 for each child)
- Glue or tape

GROUPING

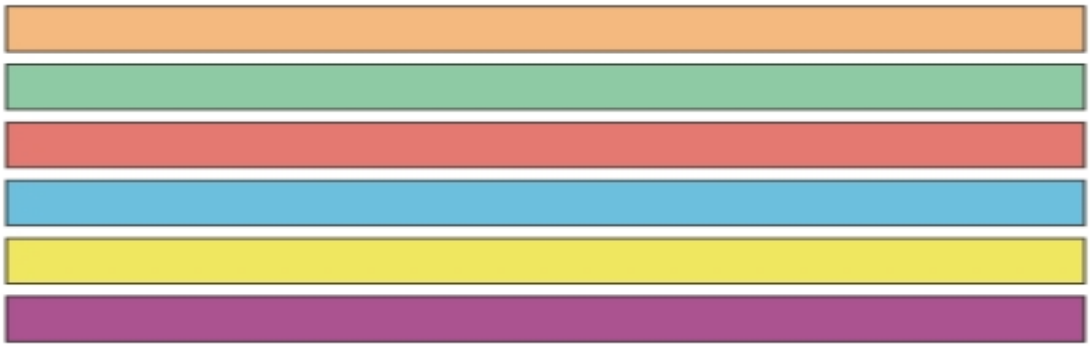
Individual/Partner Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
To assess prior knowledge, ask students to create a list of ways they use fractions in their daily lives. Discuss different ways students use fractions in their everyday activities. Some examples may include dividing a snack in half (1/2), eating 3/8 of a pizza, using measuring cups or spoons while baking, money (half a dollar), time (quarter of an hour).

Read aloud and discuss, Whole-y Cow! by Taryn Souders (or another book about the concept of fractions).

To begin the lesson, give students six strips of paper in six different colors. Specify one color and have students hold up one strip of this color. Tell students that this strip will represent the whole. Have students write "one whole" on the fraction strip. The term **whole** is included in the labeling instead of 1 because it helps eliminate confusion between the numeral 1 in fractions such as ½.



Next, ask students to pick a second strip and fold it into two equal pieces. Have students draw a line on the fold. Ask students what they think each of these strips should be called (one-half or ½). It is important, here, for students to understand how fractions are named. In this case we have divided the whole into two pieces, so we put write a two on the bottom of the fraction (denominator). Point to each individual piece and ask students how many of the two pieces is this? (1) This is how we write fractions. The denominator tells us how many pieces are in the whole or set. The numerator tells us how many of those pieces we are referencing. Have students label their strips accordingly using both the word and the fractional representation. Label both sides of the strip "1/2 one-half."

Have students take out another strip, fold it in half twice, and divide it into four congruent pieces. Ask them what they think each of these strips should be called (one-fourth or ¼). Have students draw lines on the folds and label the strips using both the word and the fraction. Label all four sections of the strip "1/4 one-fourth". Repeat the process of folding in half and naming eights.

Students will take out another strip, fold it in thirds and divide it into three congruent pieces. Ask them what they think each of these strips should be called (one-third or 1/3). Have students draw lines on the folds and label the strips using both the word and the fraction. Label all three sections of the strip "1/3 one-third". Repeat the process of folding in thirds and then in half to create sixths. Label each section "1/6 one-sixth."
After folding and labeling strips of paper for the whole, halves, thirds, fourths, sixths, and eighths, ask students to glue or tape the strips on their file folder in order (largest fractional pieces to smallest fractional pieces). Make sure the students line up the strips evenly so that they begin to see equivalences. Suggestion: Secure the ½ strip first with the half mark on the crease in the file folder. Place every other paper strip in line with one-half.

Part II
Arrange students in small groups of 2-3 students. Give them approximately ten minutes to write down their observations about the fraction strips. Have each group share some of their comments. Lead the groups to consider questions such as:

- How many halves does it take to make a whole strip?
- How many thirds does it take to equal one whole?
- How many fourths, sixths, eighths?

Part III
Have students work in small groups to answer the questions below. The teacher should monitor the groups, asking questions, and encouraging students to explore the concept of fractions. Have groups (at least 2-3) share their solution to question number seven. Try to pick groups who presented different ways of dividing the sandwich.

FORMATIVE ASSESSMENT QUESTIONS

- Is your strip folded into equal parts? How do you know?
- What relationships did you discover about fractions?
- What does the numerator represent?
- What does the denominator represent?

DIFFERENTIATION

Extension
- Have students create additional fraction strips and write about relationships.

Intervention
- Use ready-made Fraction Tiles or Virtual Manipulatives.

- Class Fractions
  Use a group of students as the whole – for example, six students if you want to work on 1/3s, 1/2s, and 1/6s. Ask students, "What fraction of our friends (are wearing tennis shoes, have brown hair, etc.)?" Change the number of people over time.

Adapted from Elementary and Middle School Mathematics: Teaching Developmentally By John A. Van de Walle, Karen S. Karp, and Jennifer M. Bay-Williams, p. 290.

TECHNOLOGY RESOURCES

http://www.kidsnumbers.com/turkey-terminator-math-game.php

http://www.visualfractions.com/

http://nlvm.usu.edu/en/nav/frames_asid_103_g_1_t_1.html?from=topic_t_1.html

http://nlvm.usu.edu/en/nav/frames_asid_274_g_2_t_1.html?open=activities&from=topic_t_1.html

http://nlvm.usu.edu/en/nav/frames_asid_104_g_2_t_1.html?from=topic_t_1.html

Name: _____ Date: _____

EXPLORING FRACTIONS

(Adapted from a lesson by Angela Lacey Hester, Floyd County, GA)

1. Using complete sentences and math words, write 3 observations you and your group made about the Fraction Strips.

Use your Fraction Strips to answer the following questions.

2. How many thirds does it take to equal one whole?

3. How many sixths does it take to equal one whole?

4. What do you think three 1/8 strips might be called? How would you write that fraction?

5. If you made a 1/9 fraction strip, how many ninths would it take to make a whole?

Put on your thinking caps….

6. What would a 1/10 Fraction Strip look like? Sketch and label the Fraction Strip in the space below.

7. Pretend you are having a party for 6 people. For refreshments, you are serving a 12" sub sandwich. On the back of this paper, draw and label a 12" sub (just like your Fraction Strips). Show how you would equally divide the sandwich for 6 people. Use pictures, words, and numbers to explain your reasoning.