

## The Fraction Expedition

**Objective:** Use a concrete model to "explore" the addition and subtraction of fractions.

**Materials:** 3" x 18" strips of construction paper (one each of five different colors per student)

Wooden cubes labeled  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ,  $\frac{1}{8}$ ,  $\frac{1}{16}$ ,  $\frac{1}{16}$

Scissors

Plastic bags for storing fraction kit

### Procedures:

1. Tell the participants to imagine they are on an expedition with Columbus (or an explorer that you are studying). Columbus must distribute the last loaf of bread to his remaining crew. Tear some "bread" into unequal pieces and distribute to the participants (crew). Ask the participants if they think the bread was divided fairly. What was wrong with the way it was divided? This question should bring the discussion around to talking about equal shares and fractional parts. In this lesson, they will explore addition and subtraction of fractions.
2. Give each student one strip of paper and have them label it "one whole."
3. Have participants fold a second strip in half and cut it into two pieces, labeling each piece " $\frac{1}{2}$ " and "one half."
4. Have participants continue folding, cutting, and labeling three other strips, one each for fourths, eighths, and sixteenths.
5. Have participants work in pairs to play the following fraction game:
  - Use your "whole" strip as a game board and the cube marked with fractions.
  - Partners take turns rolling the cube to determine what size fraction piece to place on their game board.
  - The first person to completely cover the whole strip without going over wins.

6. During exploration ask questions such as these:
- What are some combinations of fractions you have had on your game board that make 1 (a whole)?
  - What information do the pieces on your game board give you about how much you have and how much you need to win?
  - How could you use number sentences to record what has happened in the game?
  - Your game board shows  $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{2} = 1$ . How could you trade your fraction pieces to make a shorter sentence? ( $\frac{1}{2} + \frac{1}{2} = 1$ )
  - How could you trade fraction pieces to have a number sentence with all the same denominators? ( $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + (\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8}) = 1$ , so  $\frac{1}{2} = \frac{4}{8}$ ).
  - Why would you want a number sentence with all the same denominators?
7. To summarize, discuss statements such as these:
- Fractions can be added and subtracted.
  - If the denominators are the same in two fractions, you add or subtract the numerators and keep the same denominator to find the sum or difference.
  - It is possible to add fractions that have different denominators by finding equivalent fractions that have the same denominators.
  - You can estimate the sum or difference of two fractions if you know their relative values and their values in relation to 1.

#### Extensions:

1. If each student gets  $\frac{1}{4}$  loaf of bread, how many loaves will we need to feed our class?
2. If every student needs  $\frac{1}{3}$  quart of milk, how many quarts of milk will the class need? (The fraction kit does not contain  $\frac{1}{3}$ . How will you solve this?)
3. Play the fraction game in reverse. Cover the game board (the "whole" strip) with the two half-pieces. Roll the die to tell you what to take off (trades may have to be made). The first person to take off the exact amount of fraction pieces (to remove a total of 1) is the winner.

4. Make a fraction kit with paper circles, paper equilateral triangles, interlocking cubes. Describe how the process is alike or different from using the rectangular strips of paper.

**Assessment:**

- Trainer observation of participation during activities and discussion.
- Participants' writings that assess their understanding of fraction concepts.
- Participants working in pairs to decide which is larger,  $\frac{2}{3}$  or  $\frac{3}{4}$ , and explaining their reasoning.

**Notes:**

- Students with poor or limited fine motor skills may need help cutting their strips.
- Flip over and use for measurement

whole	gallon
half	half gallon
fourth	quart
eighth	pint
sixteenth	cup