Rational Number Project

Initial Fraction Ideas	**Materials**
Lesson 21: Overview	∞ Fraction Circles for students and teacher
Students explore fraction subtraction within take away and difference contexts. Students estimate and solve story problems with fraction circles.	∞ Student Page A, B and C

Teaching Actions

Warm Up

Estimate – Is the sum greater or less than 1?
Use fraction circles to add these fractions.

$\dfrac{3}{4}+\dfrac{1}{6}$ $\qquad$ $\dfrac{1}{5}+\dfrac{2}{3}$ $\qquad$ $\dfrac{5}{6}+\dfrac{5}{12}$

Large Group Introduction

1. Consider the development of fraction subtraction as a problem solving activity. Let students explore, in groups, using the circle pieces and creating their own solution strategies.

2. Introduce this take away problem. Ask students to act out the problem in their groups. Explain that you will be soliciting, at random, someone to explain their group's work to the whole class.

   Alice noticed that there was 3/4 of a pizza left after the party. She ate a slice of pizza that was the size of 1/8 of a whole pizza. How much pizza was left after Alice ate a slice?

3. Before group work, ask for estimates. Will there be more or less than $\dfrac{1}{2}$ pizza left? Try picturing the $\dfrac{3}{4}$ pizza in your mind. Does this help in your estimate? Explain your thinking. (Record estimates on the board).

Comments

This lesson will take two class periods.

Developing subtraction of fractions from contexts is more difficult than for fraction addition. There is more than one context for subtraction: take away, finding the difference, how many more.

You should expect students to solve each story problem type at the concrete level differently. Students will match their actions with the fraction circles with the action from the story problem.

In this module you should be only interested in concrete solutions to subtraction problems and estimation of reasonable answers.

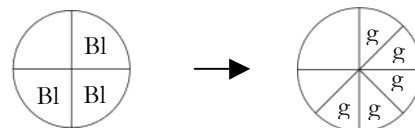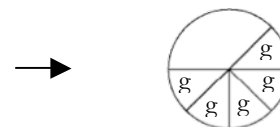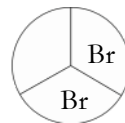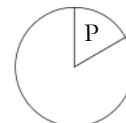| **Teaching Actions**	**Comments**
4. Have students try to act out the problem. As you monitor their work, consider these hints: ∞ Can you show $\frac{3}{4}$ of a pizza with the circles? ∞ Is $\frac{1}{8}$ > or < than $\frac{1}{4}$? ∞ What is the action in the story? ∞ Can you take away $\frac{1}{8}$ if the model is shown with 3 blues? ∞ Can you use your ideas of equivalence to help you?	In the take-away model, students may build the first fraction and take away the second. Take away
5. Randomly select a student to explain how his/her group attempted to act out the problem. Deemphasize an exact answer, but help students verbalize their group's reasoning and discussion.	
6. Repeat the same story problem with these new numbers: $\frac{1}{2}, \frac{1}{8}$ $1, \frac{3}{4}$ $\frac{2}{3}, \frac{1}{6}$	
6. Close the introduction with a story problem that represents a difference model. Ask students to act out this story problem: *Joe & Renata each receive the same allowance. Joe spent $\frac{2}{3}$ of his allowance on records. Renata spent $\frac{1}{6}$ of her allowance repairing her bicycle. How much more did Joe spend than Renata?* Ask: Is it easier to compare amounts when they are shown with the same colored pieces? Estimate answer. Will the difference be greater or less than $\frac{1}{2}$? Why?	In the difference model, students may construct 2 separate models for the 2 fractions in the story and compare models. For example: Joe's amount Renata's amount

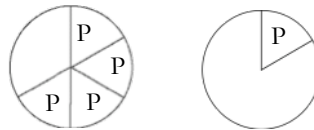| Teaching Actions	Comments
7. As you monitor their group work consider these hints: ∞ Is the action in this story different than in the pizza problem? ∞ Can you show Joe's amount? Renata's amount? ∞ Can you use your ideas of equivalence? 8. Have students share solution strategies. Talk about differences in actions in the two problem types. 9. Repeat the same story with these numbers: $\dfrac{1}{2}$ $\dfrac{1}{4}$ $\dfrac{2}{3}$ $\dfrac{2}{3}$ $\dfrac{6}{8}$ $\dfrac{1}{2}$ **Group/Partner Work** 10. Student Pages A and B provide practice with story problems. Spend time in class having students explain their strategies for solving these problems. Student Page C provides some challenges. **Wrap Up** 11. Select problems from Student Pages A and B and have students share how they used fraction circles to solve the problems. 12. The last four problems on Student Page C involve ordering ideas and subtraction. Pick a couple to do together in large group.	Change to pink: Joe spent $\dfrac{3}{6}$ more. Some may still use the take-away model. Again, you will want to use this lesson plan over 2 days. You may want to introduce the take-away model one day & the difference model the next day. The goal is for students to be able to act out the problems with fraction circles, talking about what they are doing.

Translations:
∞ Real life to manipulatives to verbal
∞ Written symbols to manipulatives to verbal
∞ Real life to manipulative to pictures

Estimate – Is the sum greater or less than 1?

$$\frac{3}{4}+\frac{1}{6} \qquad \frac{1}{5}+\frac{2}{3} \qquad \frac{5}{6}+\frac{5}{12}$$

Use fraction circles to add these fractions.

Fraction Operations: Finding the Exact Answer

1. Joe lives $\frac{4}{10}$ a mile from school. Mary lives $\frac{1}{5}$ of a mile away. How much farther from school does Joe live than Mary? Draw pictures to show what you did with the circles.

Estimate: _____

2. Because of a rainstorm the water level in a swimming pool rose by $\frac{9}{12}$″. The following day it dropped by $\frac{4}{6}$″. What was the total change in water level? Draw pictures to show what you did with the circles.

Estimate: _____

3. Velicia spent $\frac{1}{3}$ of her allowance on a CD and $\frac{4}{6}$ of her allowance on a movie. What fraction of her allowance did she have left? Draw pictures to show what you did with the circles.

Estimate: _____

Fraction Operations Continued

1. A clerk sold three pieces of ribbon. The red piece was $\frac{1}{3}$ of a yard long. The blue piece was $\frac{1}{6}$ of a yard long. The green piece was $\frac{10}{12}$ of a yard long.

   a) How much longer was the green ribbon than the red ribbon?

   b) How much longer was the green ribbon than the blue ribbon?

   c) Are the red ribbon and blue together greater than, less than, or equal in length to the green ribbon?

   d) If the red and blue together are greater than the green, how much greater are they? If shorter, how much shorter are they?

5. With your fraction circles, find the exact answers

$$\frac{4}{5} - \frac{3}{10} \qquad \frac{1}{4} + \frac{5}{8} \qquad \frac{7}{8} - \frac{1}{3} \qquad \frac{1}{2} + \frac{3}{8} \qquad \frac{3}{5} - \frac{2}{5}$$

Challenges

1.
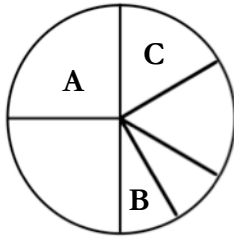
Shade Parts A, B, and C

a) How much larger is part A than part B?

b) How much larger is part A than part C?

c) How much larger is part C than part B?

d) How much are parts A and C together?

e) How much greater are parts A and C together than part B?

f) Are parts C and B together greater than A? If so, how much greater? If not, how much smaller?

2. Describe how you solved the problems.

3. Circle the larger fraction in each pair. Then find out how much larger that fraction is.

$\dfrac{1}{4}$ $\dfrac{1}{3}$ $\dfrac{1}{2}$ $\dfrac{2}{5}$ $\dfrac{2}{4}$ $\dfrac{5}{6}$ $\dfrac{1}{2}$ $\dfrac{5}{6}$