

LESSON 9

Objective

Compose and relate decimal fractions.

Common Core State Standards

- **4.NF.5** Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express $\frac{3}{10}$ as $\frac{30}{100}$, and add $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$.

Number and Operations—Fractions

Composing Decimal Fractions

Students transition into their work with decimals by investigating and applying the relationships among decimal fractions—fractions whose denominators are multiples of 10. Base Ten Blocks and the Hundred Chart are effective tools for helping students visualize these relationships. To start, students focus on the relationship between tenths and hundredths.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** What does the hundred flat represent? What do the 4 rods represent? How can we write 4 tenths as a fraction? What do the 7 units represent? How can we write 7 hundredths as a fraction?
- **Ask:** How do we get the total fraction of bags tied? **Say:** We can find the sum of $\frac{4}{10}$ and $\frac{7}{100}$.
- Discuss why $\frac{40}{100}$ is equivalent to $\frac{4}{10}$. Point out that 40 units would cover the same number of squares on the flat as 4 rods do. If appropriate, discuss multiplying $\frac{4}{10}$ by $\frac{10}{10}$ as a method.

Solve It

With students, reread the problem. Have students draw models of the fraction of bags that are tied. Then have them write the number sentence $\frac{4}{10} + \frac{7}{100} = \frac{40}{100} + \frac{7}{100} = \frac{47}{100}$.

More Ideas

For other ways to teach about decimal fractions—

- Have students use a Hundred Chart (BLM 11) to visualize decimal fractions. Have them color 5 rows plus 3 units and add the corresponding fractions $\frac{5}{10}$ and $\frac{3}{100}$.
- Have students use Coin Tiles and relate the concept of decimal fractions to money. Explain that a dollar can be broken down into 100 parts using pennies, and into 10 parts using dimes. Have them find what fraction of a dollar 6 dimes and 6 pennies is.

Formative Assessment

Have students try the following problem.

The drama club is putting on a play. They have set up 10 rows of 10 chairs for the audience. The students in the play were allowed to save seats for family. In all, they saved the first 3 rows plus 2 chairs in the next row. Which shows the fraction of the seats that were saved?

- A. $\frac{10}{32}$ B. $\frac{32}{10}$ C. $\frac{30}{100}$ D. $\frac{32}{100}$

Try It! 30 minutes | Groups of 3

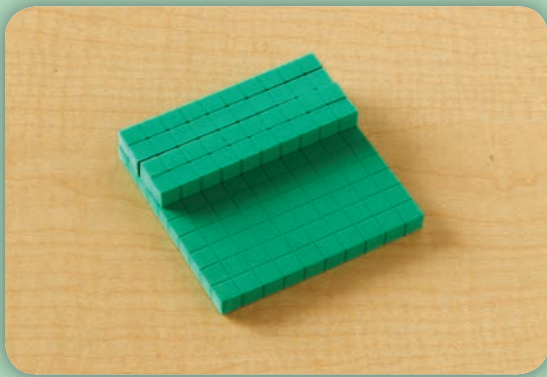
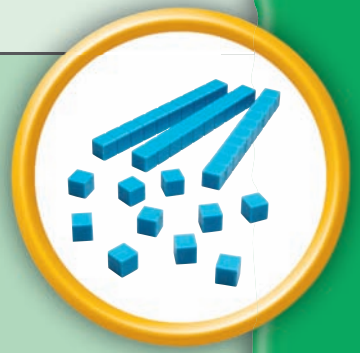
Here is a problem about composing and relating decimal fractions.

The fourth grade classes gathered items to send to troops overseas. They have enough items to make 100 care packages. To make the packages they laid out 100 bags in rows of 10. To show when a bag is filled, a student ties up the bag with a ribbon. So far, the first 4 rows of bags are tied and 7 bags are tied in the fifth row. What fraction of the bags have the students filled?

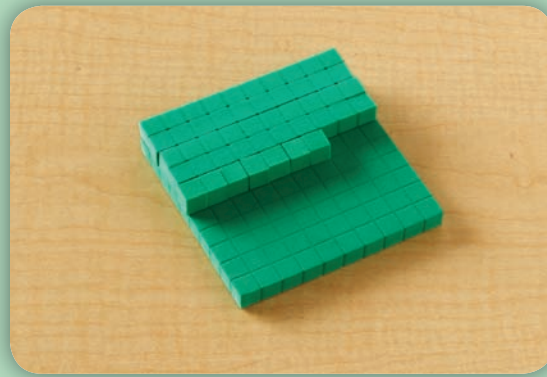
Introduce the problem. Then have students do the activity to solve the problem. Distribute Base Ten Blocks, paper, and pencils to students.

Materials

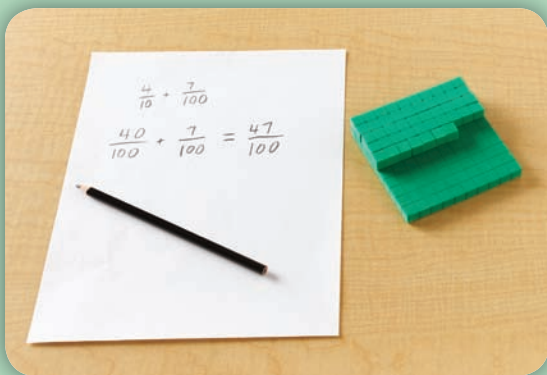
- Base Ten Blocks (1 flat, 5 rods, and 10 units per group)
- paper and pencils



1. Say: The bags are laid out in 10 rows of 10 bags. Use a hundred flat to represent all the bags. **Ask:** How many full rows of tied bags are there? Have students model the 4 rows by placing 4 rods on the flat.



2. Say: The problem says there are 7 bags tied in the fifth row. **Ask:** How can we represent these bags on the flat? Elicit that 7 unit blocks can be used. Have students place the blocks on the flat.



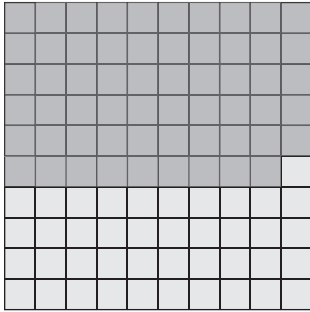
3. Say: The 4 rods cover 4 of the 10 rows, or $\frac{4}{10}$ of the hundred flat. The 7 units cover 7 of the 100 squares, or $\frac{7}{100}$ of the flat. Help students see this. **Ask:** What is $\frac{4}{10} + \frac{7}{100}$? Elicit from students that $\frac{4}{10}$ is equivalent to $\frac{40}{100}$ by suggesting that the 4 rods could be replaced by 40 units. Have students write $\frac{4}{10} + \frac{7}{100} = \frac{40}{100} + \frac{7}{100} = \frac{47}{100}$.

! Look Out!

Watch for students who simply say that 47 bags are ready. Explain that they need to find the fraction of the 100 bags that is ready.

Use Base Ten Blocks. Build the model and use it to solve the problem. Complete the equation. (Check students' work.)

1. Melissa has 5 dimes and 9 pennies. What fraction of a dollar does she have?

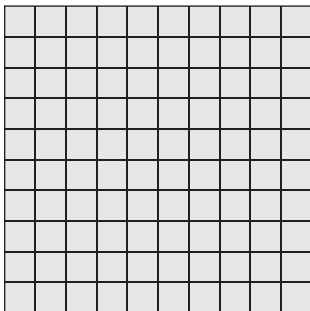


$$\frac{50}{100} + \frac{9}{100} = \frac{59}{100}$$

$$\frac{5}{10} + \frac{9}{100} = \frac{50}{100} + \frac{9}{100} = \frac{59}{100}$$

Use Base Ten Blocks to model the problem. Sketch the model and use it to solve the problem. Write an equation. (Check students' models.)

2. The fourth graders are using the cafeteria for a meeting. There are 10 tables, and each table seats 10 students. When all the students are seated, 7 tables are filled, and one table has 3 students. What fraction of the seats is being used?



$$\frac{7}{10} + \frac{3}{100} = \frac{70}{100} + \frac{3}{100} = \frac{73}{100}$$

Find each sum.

3. $\frac{7}{10} + \frac{5}{100} = \frac{75}{100}$

4. $\frac{6}{100} + \frac{9}{10} = \frac{96}{100}$

5. $\frac{8}{10} + \frac{1}{100} = \frac{81}{100}$

6. $\frac{2}{100} + \frac{6}{10} = \frac{62}{100}$

7. $\frac{3}{10} + \frac{1}{100} = \frac{31}{100}$

8. $\frac{1}{10} + \frac{1}{100} = \frac{11}{100}$

Answer Key

Challenge! The school is setting up a new computer lab. So far, there are 100 desks set up in 10 rows. Four full rows of desks have computers, and 5 desks in the next row have computers. What fraction of the desks does NOT have a computer yet?

Challenge: $\frac{45}{100}$ of the desks have computers. So $\frac{55}{100}$ of the desks do not have computers.

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