

LESSON 1

Objective

Understand place value in decimal numbers.

Common Core State Standards

- **5.NBT.1** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.
- **5.NBT.3a** Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (\frac{1}{10}) + 9 \times (\frac{1}{100}) + 2 \times (\frac{1}{1000})$.

Number and Operations in Base Ten

Decimals

Decimal place value is an extension of whole-number place value, which students have studied previously. A common model used to help students understand place value is Base Ten Blocks, which work with both decimals and whole numbers. In this activity, students use the blocks to model tenths, hundredths, and thousandths.

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

Talk About It

Discuss the Try It! activity.

- **Ask:** *What fraction of the whole does a flat represent?* Elicit that a flat is $\frac{100}{1,000}$, or $\frac{1}{10}$ of the whole.
- **Ask:** *What fraction of the whole does a rod represent?* Elicit that a rod is $\frac{10}{1,000}$, or $\frac{1}{100}$ of the whole.
- **Ask:** *What fraction of the whole does a unit represent?* Elicit that a unit is $\frac{1}{1,000}$ of the whole.
- Tell students that the expression $0.1 + 0.02 + 0.005$ is an expanded form of the decimal number 0.125. Present and discuss the equivalent form $1 \times \frac{1}{10} + 2 \times \frac{1}{100} + 5 \times \frac{1}{1,000}$.

Solve It

Reread the problem with students. Elicit from students that the 125 cyclists in each group represent a fraction of the 1,000 cyclists in the race and that this fraction, $\frac{125}{1,000}$, also can be expressed using the decimal number 0.125. Both numbers mean “one hundred twenty-five thousandths.” Students break 0.125 into place-value parts to model this number using 125 total units.

More Ideas

For other ways to teach decimals—

- Have students use Base Ten Blocks to model other decimal numbers, such as 0.6, 0.42, 0.07, 0.305, 0.009, and 0.231.
- Have students use Base Ten Blocks to show that 1 tenth (flat) = 10 hundredths (rods) = 100 thousandths (units). Then have them write the corresponding decimal numbers, $0.1 = 0.10 = 0.100$, and the corresponding fractions, $\frac{1}{10} = \frac{10}{100} = \frac{100}{1,000}$.

Formative Assessment

Have students try the following problem.

Which of the following is an expanded form of 0.408?

- A. $0.4 + 0.8$ B. $0.4 + 0.08$ C. $0.4 + 0.008$ D. $0.04 + 0.008$

Try It! 20 minutes | Groups of 3

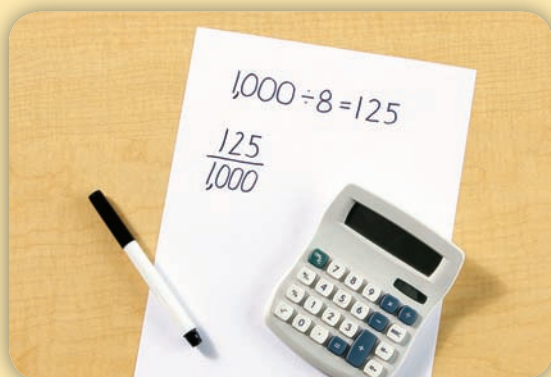
Here is a problem about decimals.

A bicycle race has 1,000 cyclists divided into 8 equal groups. Each group will start the race at a different time. The first group starts at 8:00 AM, the second group starts at 8:15 AM, the third group starts at 8:30 AM, and so on. Write and model a decimal number for the fraction of the 1,000 cyclists that is represented by each group.

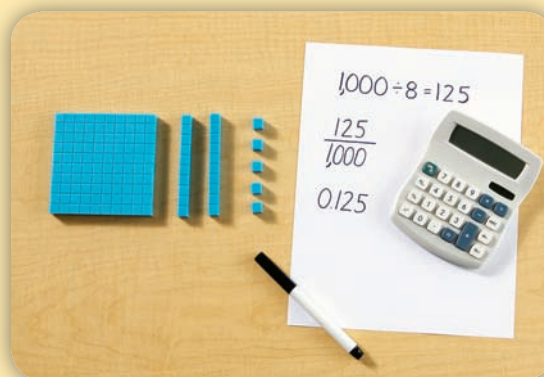
Introduce the problem. Then have students do the activity to solve the problem. Distribute Base Ten Blocks, worksheets, paper, and pencils. Display the large cube and say it represents the whole (1,000 cyclists). Have students determine the values of the other blocks.

Materials

- Base Ten Blocks (1 flat, 10 rods, and 20 units per group, and 1 large cube for teacher demonstration)
- Decimal Models (BLM 1; 1 per group)
- paper (1 sheet per group)
- colored pencils (1 per group)



1. Say: Calculate the number of cyclists in each group. Students divide 1,000 by 8 and get 125.
Ask: If there are 125 cyclists in each group and 1,000 cyclists altogether, what fraction does each group represent? Write the fraction. Students write $\frac{125}{1,000}$.



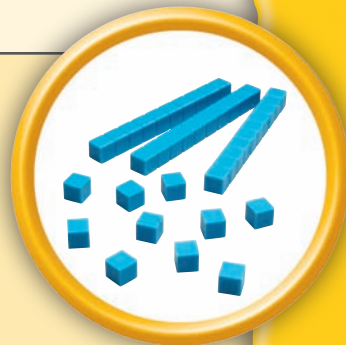
2. Say: Model this fraction as a decimal. The decimal has three parts: tenths, hundredths, and thousandths. Students use 1 flat, 2 rods, and 5 units. **Ask:** How could we redefine the Base Ten Blocks so we can represent this decimal?



3. Say: Now, color and complete the worksheet to match the blocks you used to represent 0.125. Students complete the worksheet.

Look Out!

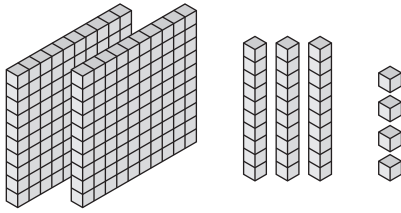
Students might think that the 1 flat, 2 rods, and 5 units represent the whole number 125, rather than the decimal number 0.125. This is good mathematical thinking, because these blocks can represent both 125 and 0.125! Explain this to students in terms of place value.



Use Base Ten Blocks to model each number as a fraction of 1,000. Write the decimal. Tell the number in each place-value position.

(Check students' work.)

1.



0.234

2

tenths

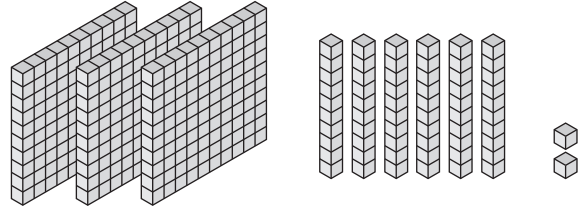
3

hundredths

4

thousandths

2.



0.362

3

tenths

6

hundredths

2

thousandths

Using Base Ten Blocks, model the number as a fraction of 1,000. Sketch the model. Write the decimal. Tell the number in each place-value position.

3. 412 out of 1,000

(Check students' models.)

0.412

4

tenths

1

hundredths

2

thousandths

Write each fraction as a decimal.

4. $\frac{556}{1,000}$

0.556

5. $\frac{135}{1,000}$

0.135

6. $\frac{89}{1,000}$

0.089

7. $\frac{210}{500}$

0.420

8. $\frac{80}{500}$

0.160

9. $\frac{442}{500}$

0.884

Answer Key

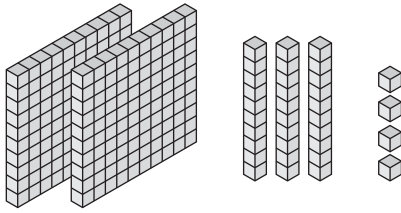
Challenge! Explain why you want the denominators of these fractions to be 1,000 when you are writing a fraction as a decimal. In Problems 7–9, what must you do to get the fraction so that the denominator is 1,000?

Challenge: (Sample) When the denominator is 1,000, the decimal equivalent is the numerator written as thousandths. For Problems 7–9, the denominator is 500. Multiply both the numerator and denominator by 2 so that the denominator is 1,000. Then, the decimal equivalent is the numerator written in thousandths.

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Use Base Ten Blocks to model each number as a fraction of 1,000. Write the decimal. Tell the number in each place-value position.

1.

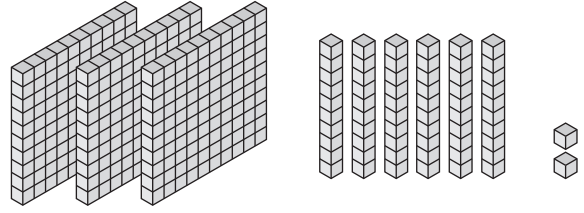


_____ tenths

_____ hundredths

_____ thousandths

2.



_____ tenths

_____ hundredths

_____ thousandths

Using Base Ten Blocks, model the number as a fraction of 1,000. Sketch the model. Write the decimal. Tell the number in each place-value position.

3. 412 out of 1,000

_____ tenths _____ hundredths _____ thousandths

Write each fraction as a decimal.

4. $\frac{556}{1,000}$

5. $\frac{135}{1,000}$

6. $\frac{89}{1,000}$

7. $\frac{210}{500}$

8. $\frac{80}{500}$

9. $\frac{442}{500}$

Challenge! Explain why you want the denominators of these fractions to be 1,000 when you are writing a fraction as a decimal. In Problems 7–9, what must you do to get the fraction so that the denominator is 1,000?

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Name _____

A blank 10x10 grid for graphing, consisting of 10 columns and 10 rows of squares.[illegible]

Patient Information	
First Name	
Last Name	
Address	
City	
State	
Zip	
Phone	
Insurance	
Physician Information	
Physician Name	
Physician Address	
Physician City	
Physician State	
Physician Zip	
Physician Phone	
Physician Insurance	
Referral Information	
Referral Number	
Referral Date	
Referral Type	
Referral Source	
Referral Reason	
Referral Status	
Referral Notes	
Referral History	
Referral Date	
Referral Type	
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Referral Reason	
Referral Status	
Referral Notes	
Referral Summary	
Referral Date	
Referral Type	
Referral Source	
Referral Reason	
Referral Status	
Referral Notes	

11

+

+

Number: