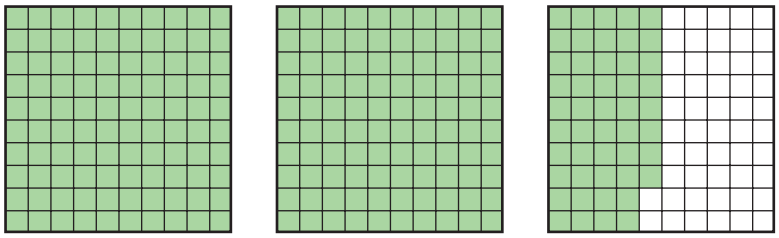
Lesson 33 Part 1: Introduction

Relate Decimals and Fractions

CCLS 4.NF.6

You know how to write equivalent fractions with denominators of 10 and 100. In this lesson, you will learn another way to write these fractions. Take a look at this problem.

Max has 248 pennies. How many whole dollars does Max have? What fraction of a dollar is left over?



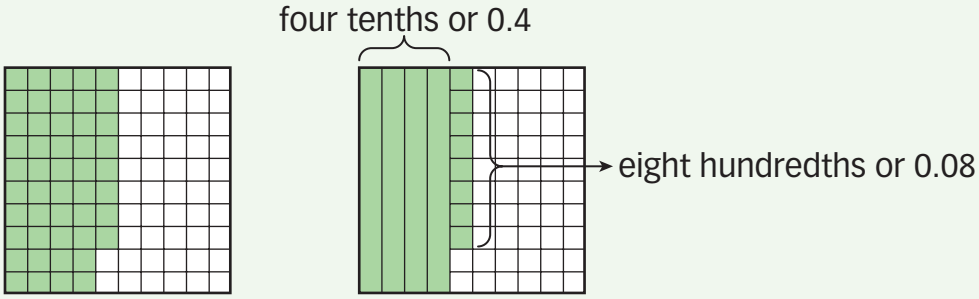
Explore It

Use the math you already know to solve the problem.

- How many pennies are there in a dollar? _____
- How many whole dollars can you make with 248 pennies? How many cents are left over? _____
- One cent is equal to what fraction of a dollar? _____
- If one cent is $\frac{1}{100}$ of a dollar, what fraction of a dollar is 48 cents? _____
- How do you write this amount of whole dollars and fraction of a dollar as a mixed number? _____
- How do you write 2 dollars and 48 cents using the $? _____

Find Out More

Tenths and hundredths can also be written as **decimal fractions**. Here is another way to think about the fraction $\frac{48}{100}$.



48 hundredths (0.48) is 4 tenths (0.4) and 8 hundredths (0.08)

You can use a place-value chart to understand the value of each digit. Decimals follow the same place-value pattern as whole numbers. Moving to the left multiplies each place value by 10. Moving to the right divides each place value by 10 $\left(\text{or multiplies by } \frac{1}{10}\right)$.

decimal point

Ones	.	Tenths	Hundredths
2	.	4	8

whole number

number less than 1

To read the decimal 2.48:

1. Say the whole number part, if there is one. *two*
2. Say *and* for the decimal point. *and*
3. Read the rest of the digits as a whole number. *forty-eight*
4. Say the place-value name of the last digit. *hundredths*

Say: *two and forty-eight hundredths*.

Reflect

1 Explain how thinking about money can help you understand decimals.

_____

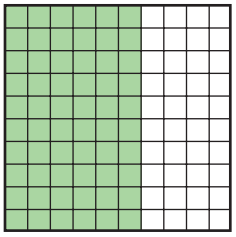
_____

Read the problem below. Then explore different ways to understand how to use fractions and decimals to name the same amount.

A soccer camp has spots for 100 students. So far, 60 of those spots are filled. Write a fraction and a decimal in tenths and hundredths to show the amount of spots that are filled.

Model It

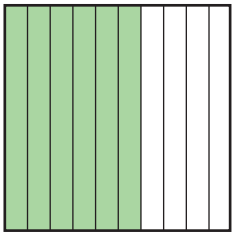
You can use a model to understand how to write tenths or hundredths as a fraction.



The large square is 1 whole.

Each small square is $\frac{1}{100}$ of the whole.

Sixty small squares are shaded.



The large square is 1 whole.

Each section is $\frac{1}{10}$ of the whole.

Six sections are shaded.

Model It

You can use a place-value chart to understand how to write hundredths or tenths as a decimal.

The place-value chart shows the value of 0.60.

Ones	.	Tenths	Hundredths
0	.	6	0

Connect It

Now you will use the models and what you know about fractions and decimals to solve the problem.

2 Look at the first model that shows 60 squares shaded. Write a fraction for the model. _____

3 Divide the numerator and denominator by 10 and write the tenths fraction. Explain why this fraction matches the second model with 6 sections shaded.

_____

4 Look at the place-value chart. Write a decimal in tenths and the equivalent decimal in hundredths. What is the difference between the two decimals?

_____

_____

5 Write a number on each line below to describe how decimals relate to fractions with denominators of 10 and 100.

If the denominator of a fraction is 10, the equivalent decimal has _____ place after the decimal point.

If the denominator of a fraction is 100, the equivalent decimal has _____ places after the decimal point.

Try It

Use what you just learned to find related fractions and decimals. Show your work on a separate sheet of paper.

6 Write a decimal equivalent to $\frac{83}{100}$. _____

7 What tenths decimal is equivalent to $\frac{2}{10}$? Draw a model that shows the fraction and the decimal. _____

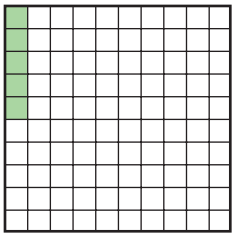
Read the problem below. Then explore different ways to write a decimal as an equivalent fraction.

Eli collects sports cards. 0.05 of his cards are baseball cards. What fraction of his cards are baseball cards?

Model It

You can use a model to help write a decimal as an equivalent fraction.

The model shows 0.05.



Model It

You can also use a place-value chart to help write a decimal as an equivalent fraction.

The place-value chart shows the value of 0.05.

Ones	.	Tenths	Hundredths
0	.	0	5

Connect It

Now you will use the model and the place-value chart to solve the problem.

8 How can the model help you write a fraction equivalent to 0.05?

_____

_____

9 How can the place-value chart help you write a fraction equivalent to 0.05?

_____

_____

10 Use words to describe the fraction of Eli's cards that are baseball cards.

_____

11 What fraction of Eli's cards are baseball cards? _____

12 Explain how you can write a decimal in hundredths as a fraction.

_____

_____

_____

Try It

Use what you just learned to write decimals as fractions. Show your work on a separate sheet of paper.

13 Write 0.9 in words and as a fraction. _____

14 Write 0.89 in words and as a fraction. _____

The student used a place-value chart. The tenths place is the first place to the right of the decimal point.

Pair/Share

How could you solve the problem using a model?

How could drawing a model help you?

Pair/Share

How do you know if the decimal represents tenths or hundredths?

Study the model below. Then solve problems 15–17.

Student Model

Jayne read that it takes about two tenths of a second to blink an eye. She wrote that a blink takes about 0.02 of a second. Is Jayne correct?

Look at how you could show your work using a place-value chart.

Ones	.	Tenths
0	.	2

Two tenths as a decimal is 0.2, not 0.02.

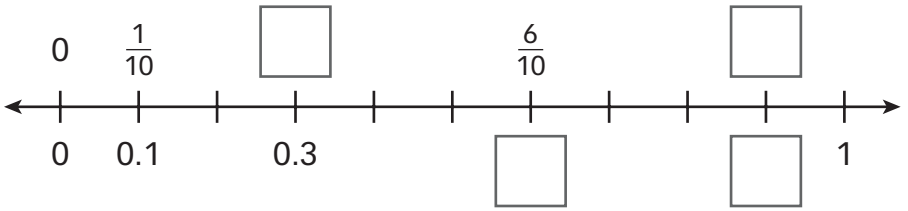
Solution: **Jayne is not correct. Two tenths is 0.2.**

15 What is 0.7 written as a fraction?

Show your work.

Solution: _____

16 The number line below shows 1 whole divided into tenths. Write numbers in the boxes to label the missing fractions and decimals. Explain how you know what numbers to write.



Show your work.

Could saying each number aloud help?

Pair/Share

How could you show hundredths on this number line?

17 What decimal names the same number as $\frac{50}{100}$? Circle the letter of the correct answer.

A 0.50

B 0.05

C 50.0

D 50.100

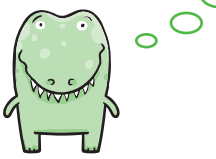
Abby chose **B** as the correct answer. How did she get that answer?

_____

_____

_____

What does the denominator of the fraction tell you?



Pair/Share

What is a decimal in tenths that is equivalent to $\frac{50}{100}$?

Answer Form

1 Ⓐ Ⓑ Ⓒ Ⓓ
2 Ⓐ Ⓑ Ⓒ Ⓓ
3 Ⓐ Ⓑ Ⓒ Ⓓ

Number Correct /3

Solve the problems. Mark your answers to problems 1–3 on the Answer Form to the right. Be sure to show your work.

1 Which fraction and decimal are equivalent?

A $\frac{4}{10}$ and 0.04

B $\frac{6}{100}$ and 0.6

C $\frac{9}{100}$ and 0.09

D $\frac{7}{10}$ and 7.10

2 A sign on the highway says an exit is $\frac{3}{10}$ of a mile ahead. What is the decimal form of $\frac{3}{10}$?

A 30.0

B 0.03

C 3.10

D 0.3

3 What is 0.75 written as a fraction?

A $\frac{.75}{100}$

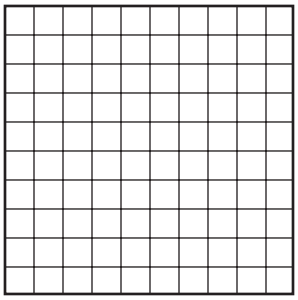
B $\frac{0}{75}$

C $\frac{75}{100}$

D $\frac{75}{10}$

4 A test has 100 questions. Cora got 85 questions correct. What decimal shows the fraction of the test questions she answered correctly? What decimal shows the fraction of the test questions she answered incorrectly? Use a drawing to support your answer.

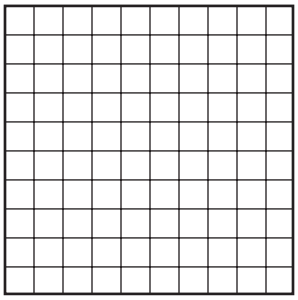
Show your work.



Answer _____

5 Kelly finds some dimes and pennies in her dad's car. She finds 5 coins in all. The coins total more than 20 cents, but less than 50 cents. What coins could Kelly have found? Write the amount as a fraction of a dollar and as an equivalent decimal. Model the fraction and decimal on the grid.

Show your work.



Answer Kelly could have found _____

Lesson 33 (Student Book pages 294–303)

Relate Decimals and Fractions

LESSON OBJECTIVES

- Convert decimals into fractions, with denominators of 10 or 100.
- Convert fractions into decimals, with denominators of 10 or 100.

PREREQUISITE SKILLS

- Rewrite a fraction that has a denominator of 10 as an equivalent fraction with a denominator of 100.
- Rewrite a fraction that has a denominator of 100 as an equivalent fraction with a denominator of 10.
- Explain the relationship between tenths and hundredths.
- Add two fractions that have a denominator of 10 or 100.

VOCABULARY

decimal fraction (or decimal): a number containing a decimal point that separates a whole from fractional place values (tenths, hundredths, thousandths, and so on)

Review the following key terms:

denominator: the bottom number in a fraction; it tells the total number of equal parts in a whole.

fraction: a number that names part of a whole

numerator: the top number in a fraction; it tells the number of parts in a whole that are being described.

THE LEARNING PROGRESSION

In earlier grades, students developed understanding of the meaning of fractions as parts of a whole and learned to recognize and generate equivalent fractions. In this lesson, students are introduced to decimals by learning how they relate to fractions. Students will convert between decimals and fractions with denominators of 10 or 100, use decimals to describe measurements, and locate decimals on a number line. It is important that students make the connection that a number can be represented as both a fraction and a decimal. Students will gain a deeper understanding of decimals later in Grade 5 when they read, write, compare, round, and compute with decimals. They will also develop understanding of decimal place values by recognizing that a digit in one place represents $\frac{1}{10}$ of what it represents in the place to its left.

Ready Toolbox Teacher-Toolbox.com

	Prerequisite Skills	*4.NF.6*
Ready Lessons	✓	✓
Tools for Instruction		✓
Interactive Tutorials		

CCLS Focus

4.NF.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as $\frac{62}{100}$; describe a length as 0.62 meters; locate 0.62 on a number line diagram.

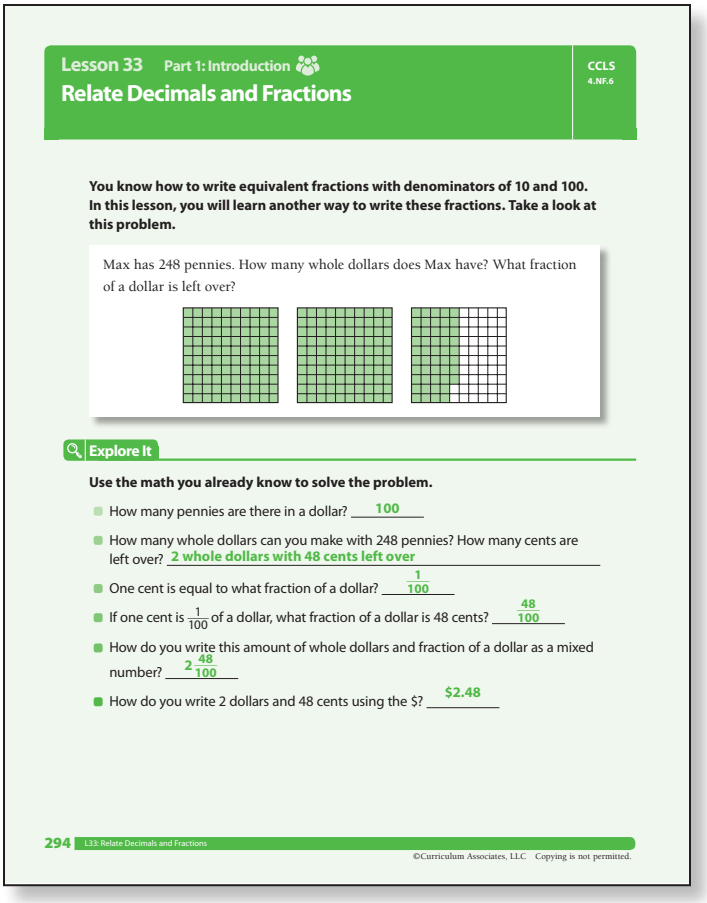
STANDARDS FOR MATHEMATICAL PRACTICE: ***SMP 2, 4, 5, 6, 7*** *(see page A9 for full text)*

AT A GLANCE

Students explore decimals, using dollars and cents. They first look at a model. Then they write the quantity as a mixed number, and finally as money, using a decimal point to separate the whole dollars and the fractional part (cents).

STEP BY STEP

- Tell students that this page models an important way to look at wholes and parts when the parts are tenths and hundredths.
- Have students read the problem at the top of the page.
- Work through Explore It as a class.
- Have students explain the model. (See Mathematical Discourse.)
- Ask student pairs or groups to explain their answers for the last two bullets. Have them discuss how the mixed number and the "dollars and cents" are the same and different.



Lesson 33 Part 1: Introduction

Relate Decimals and Fractions

CCLS 4.NF.6

You know how to write equivalent fractions with denominators of 10 and 100. In this lesson, you will learn another way to write these fractions. Take a look at this problem.

Max has 248 pennies. How many whole dollars does Max have? What fraction of a dollar is left over?

Explore It

Use the math you already know to solve the problem.

- How many pennies are there in a dollar? 100
- How many whole dollars can you make with 248 pennies? How many cents are left over? 2 whole dollars with 48 cents left over
- One cent is equal to what fraction of a dollar? $\frac{1}{100}$
- If one cent is $\frac{1}{100}$ of a dollar, what fraction of a dollar is 48 cents? $\frac{48}{100}$
- How do you write this amount of whole dollars and fraction of a dollar as a mixed number? $2\frac{48}{100}$
- How do you write 2 dollars and 48 cents using the $? $2.48

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Hands-On Activity

Model decimal amounts using dollars and cents.

Materials: play money in dollars and coins

- Give students 248 pennies.
- Have students count out 100 pennies and exchange for 1 dollar. Do this again.
- Have students count out groups of 10 pennies and exchange them for dimes, until they do not have any groups of 10 left.
- Have students write the amount as a mixed number and as dollars and cents with a $ sign and decimal point.
- If time allows, repeat with other amounts, such as $1.27.

Mathematical Discourse

- *How can you explain the way the model shows 248 pennies?*

  The two fully shaded squares represent 2 whole dollars. The other square shows 48 parts shaded to represent 48 cents, or $\frac{48}{100}$ of a dollar.

- *What do you notice that is the same about the mixed number and the "dollars and cents"? What's different?*

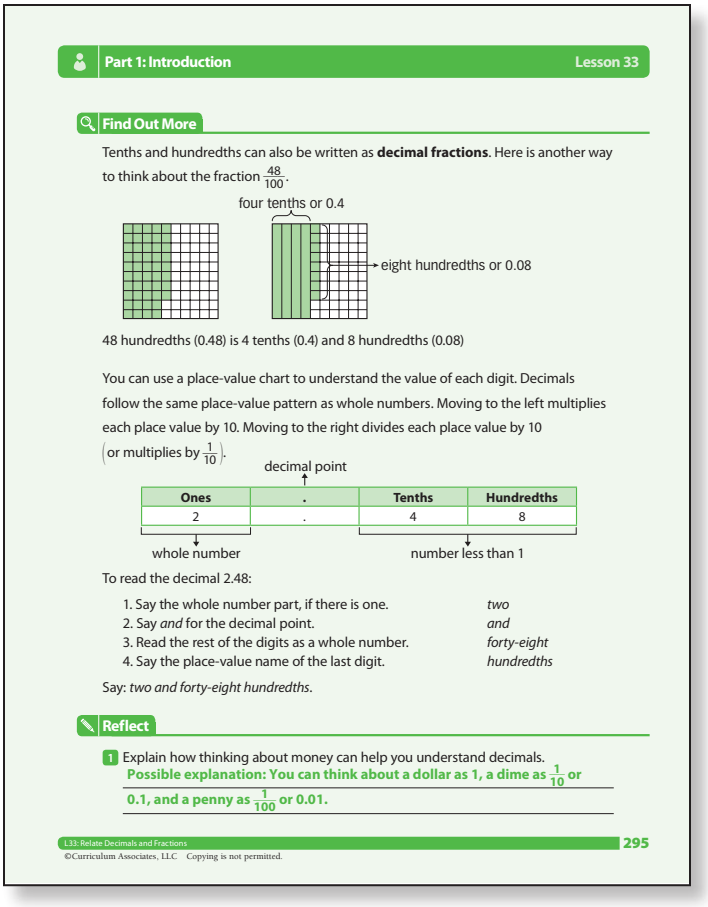
  Both models show 2 whole dollars. The mixed number shows 48 cents as a fraction, $\frac{48}{100}$. This means 48 hundredths of a dollar. The other representation puts the 48 cents to the right of a point (decimal point). This point separates the dollars and the cents in much the same way that the fraction part of a mixed number separates them.

AT A GLANCE

Students learn how to read and write decimals using fraction concepts and models, including a place-value chart. Students learn to say "and" to read a decimal point.

STEP BY STEP

- Read Find Out More as a class.
- Discuss the visual models. Point out that one model combines tenths and hundredths. Review that each tenth is equivalent to 10 hundredths.
- Discuss the place value chart. Remind students that there are 10 tenths in 1 whole.
- Go over the way to read the decimal. Point to each digit in the place-value chart as you lead the class in reading the decimal together.
- Have students write their answer to Reflect. Then discuss as a class. Guide students to write each coin as a fraction and a decimal. $\left[\text{dime: } \frac{1}{10}, 0.1; \text{ penny, } \frac{1}{100}, 0.01\right]$ Point out that when there are no ones, we write a zero in the ones place.



Part 1: Introduction Lesson 33

Find Out More

Tenths and hundredths can also be written as **decimal fractions**. Here is another way to think about the fraction $\frac{48}{100}$.

48 hundredths (0.48) is 4 tenths (0.4) and 8 hundredths (0.08)

You can use a place-value chart to understand the value of each digit. Decimals follow the same place-value pattern as whole numbers. Moving to the left multiplies each place value by 10. Moving to the right divides each place value by 10 $\left(\text{or multiplies by } \frac{1}{10}\right)$.

decimal point

Ones	.	Tenths	Hundredths
2	.	4	8

whole number — number less than 1

To read the decimal 2.48:

1. Say the whole number part, if there is one. *two*
2. Say *and* for the decimal point. *and*
3. Read the rest of the digits as a whole number. *forty-eight*
4. Say the place-value name of the last digit. *hundredths*

Say: *two and forty-eight hundredths.*

Reflect

1 Explain how thinking about money can help you understand decimals.
Possible explanation: You can think about a dollar as 1, a dime as $\frac{1}{10}$ or 0.1, and a penny as $\frac{1}{100}$ or 0.01.

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ELL Support

Explain that a decimal fraction, or decimal, is a way to use place value to represent a fraction whose denominator is a multiple of 10. Some students may recognize *deci-* as having to do with ten, or tenths. A decade is 10 years, a decimeter is $\frac{1}{10}$ of a meter, etc.

Real-World Connection

Students have been introduced to money as a familiar use of decimals. Have students look around them for other examples and discuss as a group. Some possibilities include: food scales at the deli counter, the trip odometer in a car, measurements (especially metric measurements), food labels, temperatures on a fever thermometer, etc.

Visual Model

Extend the place-value model.

- Copy the place-value chart from this page onto the board.
- Draw two additional columns to the left. Label these "Tens" and "Hundreds."
- Say, *Look at the names of the columns. What patterns do you notice?* Guide students to comment on the parallels between tens and tenths, hundreds and hundredths.

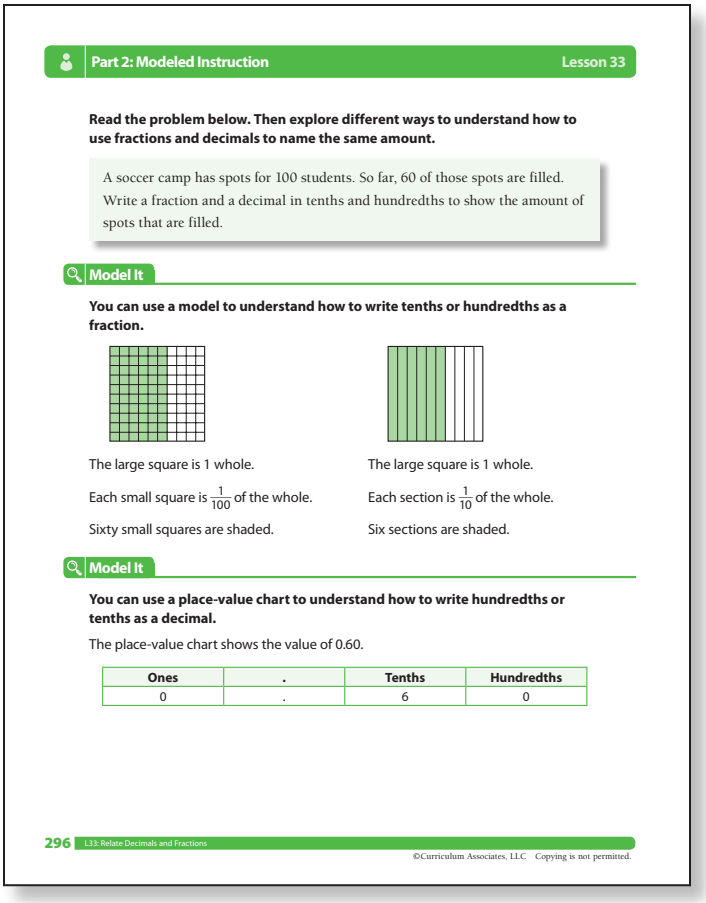
AT A GLANCE

Students use visual models and place-value charts to understand and write fractional quantities in fraction form and as decimals.

STEP BY STEP

- Read the problem at the top of the page as a class.
- Say that the first Model It shows 60 out of 100 students as a fraction. Discuss the two versions, $\frac{6}{10}$ and $\frac{60}{100}$. Guide students to see that the same amount is shaded in each model, so the fractions are equivalent.
- Discuss the second Model It. Point out that the 0 in the ones place shows that there are no whole ones. Guide students to see that there are 60 hundredths. Discuss the meaning of the 6 in the tenths place [6 tenths] and the 0 in the hundredths place [0 hundredths].

SMP Tip: Help students see the patterns and structure *(SMP 7)* in the place value chart. Point out that, just as the whole number 60 has 6 tens and 0 ones, the decimal 60 hundredths has 6 tenths and 0 hundredths. Point out again that decimals are read according to the place value of the last digit shown (i.e., the least place value, even if that digit is a zero).



Part 2: Modeled Instruction Lesson 33

Read the problem below. Then explore different ways to understand how to use fractions and decimals to name the same amount.

A soccer camp has spots for 100 students. So far, 60 of those spots are filled. Write a fraction and a decimal in tenths and hundredths to show the amount of spots that are filled.

Model It

You can use a model to understand how to write tenths or hundredths as a fraction.

The large square is 1 whole.
Each small square is $\frac{1}{100}$ of the whole.
Sixty small squares are shaded.

The large square is 1 whole.
Each section is $\frac{1}{10}$ of the whole.
Six sections are shaded.

Model It

You can use a place-value chart to understand how to write hundredths or tenths as a decimal.

The place-value chart shows the value of 0.60.

Ones	.	Tenths	Hundredths
0	.	6	0

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Mathematical Discourse

- *What do you notice about the two fractions?*

  The fractions are equivalent. One shows 6 tenths and the other shows 60 hundredths. The same amount of the square is shaded in both cases.

- *How could you write 60 hundredths as a decimal with just tenths?*

  Because 60 hundredths is equivalent to 6 tenths, you could just write 0.6 and leave off the last zero.

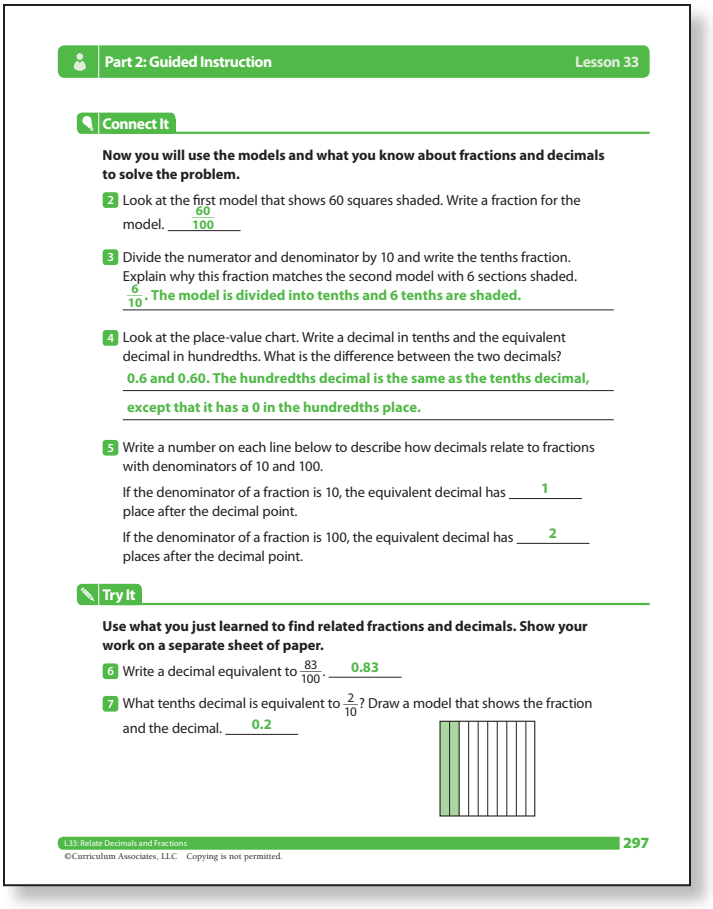
AT A GLANCE

Students revisit the problem on page 296 and use what they learned from the models to write the solution in both fraction and decimal form. They summarize their understanding and use the information to answer questions.

STEP BY STEP

- Remind students that Connect It refers to the problem on page 296.
- Work through problems 2–4 as a class.
- Have students complete problem 5 and discuss their answers. Make sure students understand that hundredths require 2 places after the decimal and tenths require 1.
- Students complete Try It on their own. Then discuss as a class. Make sure that students' models for problem 7 show tenths, not hundredths.

SMP Tip: Use this problem to informally bring up the idea of precision *(SMP 6)*. Ask students to suppose that two more soccer players sign up for the camp. Could they still write the decimal using tenths? [No, because 62 hundredths no longer has a zero in the hundredths place.] Using this knowledge, have students discuss pros and cons of representing the 60 out of 100 students as 0.6 or 0.60.



Part 2: Guided Instruction Lesson 33

Connect It

Now you will use the models and what you know about fractions and decimals to solve the problem.

2 Look at the first model that shows 60 squares shaded. Write a fraction for the model. $\frac{60}{100}$

3 Divide the numerator and denominator by 10 and write the tenths fraction. Explain why this fraction matches the second model with 6 sections shaded.
$\frac{6}{10}$. **The model is divided into tenths and 6 tenths are shaded.**

4 Look at the place-value chart. Write a decimal in tenths and the equivalent decimal in hundredths. What is the difference between the two decimals?
0.6 and 0.60. The hundredths decimal is the same as the tenths decimal, except that it has a 0 in the hundredths place.

5 Write a number on each line below to describe how decimals relate to fractions with denominators of 10 and 100.

If the denominator of a fraction is 10, the equivalent decimal has 1 place after the decimal point.

If the denominator of a fraction is 100, the equivalent decimal has 2 places after the decimal point.

Try It

Use what you just learned to find related fractions and decimals. Show your work on a separate sheet of paper.

6 Write a decimal equivalent to $\frac{83}{100}$. 0.83

7 What tenths decimal is equivalent to $\frac{2}{10}$? Draw a model that shows the fraction and the decimal. 0.2

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TRY IT SOLUTIONS

6 *Solution:* 0.83; Students may use a place-value chart to remind them that 83 hundredths is 8 tenths [0.8] and 3 hundredths [0.03].

ERROR ALERT: Students who wrote 83.100 may have tried to use the decimal point as a substitute for the fraction bar instead of writing the digits 8 and 3 in the tenths and hundredths places, respectively.

7 *Solution:* 0.2; Students may represent $\frac{2}{10}$ using a square divided into 10 columns with 2 columns shaded. They may represent 2 tenths with a 2 in the tenths column and nothing shown in the hundredths column.

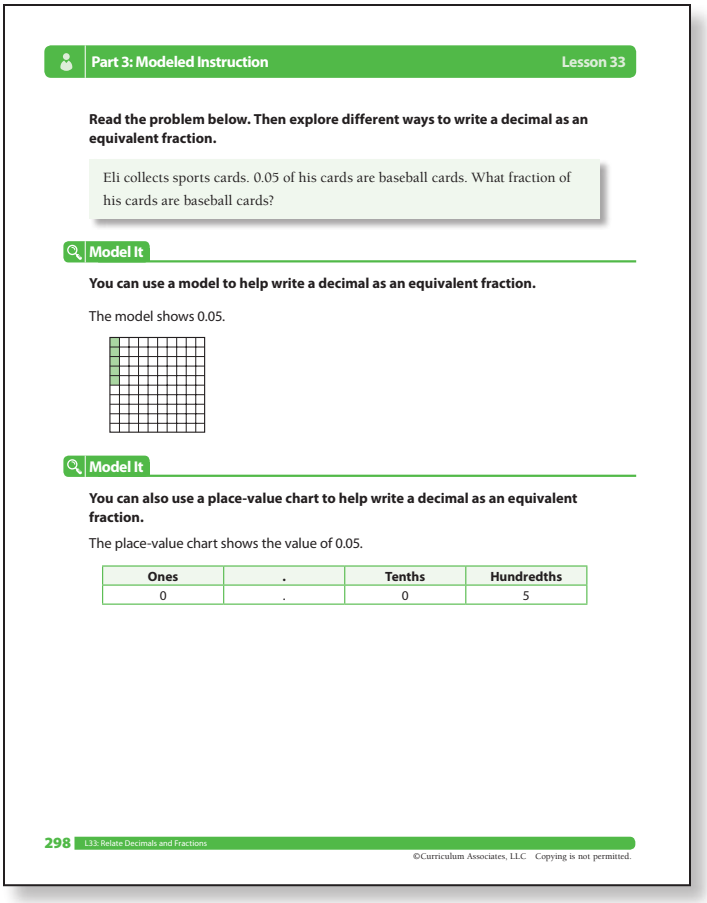
AT A GLANCE

Students use a visual model and a place-value chart to visualize how to write a decimal as a fraction.

STEP BY STEP

- Read the problem at the top of the page as a class.
- Discuss the first Model It. Ensure that all students understand how this models 0.05.
- Discuss the second Model It. Point out that 5 hundredths has 0 tenths and 5 hundredths.

SMP Tip: Discuss the problem with students and help them choose a useful model for the problem *(SMP 4)*. Brainstorm other ways that this problem could be modeled. For example, how could you show 0.5 using sports cards? [Students may suggest an array of 100 cards, in which 5 are baseball cards.] Have students discuss the merits and drawbacks of various models.



Part 3: Modeled Instruction Lesson 33

Read the problem below. Then explore different ways to write a decimal as an equivalent fraction.

Eli collects sports cards. 0.05 of his cards are baseball cards. What fraction of his cards are baseball cards?

Model It

You can use a model to help write a decimal as an equivalent fraction.

The model shows 0.05.

Model It

You can also use a place-value chart to help write a decimal as an equivalent fraction.

The place-value chart shows the value of 0.05.

Ones	.	Tenths	Hundredths
0	.	0	5

298 L33: Relate Decimals and Fractions

Hands-On Activity

Model decimals using base-ten blocks.

Materials: Base-ten blocks: flats and cubes

- Explain that students will use base-ten blocks to model decimals.
- Have students use a flat as the base for their model.
- On the flat, have students arrange 5 cubes, to represent 5 hundredths (0.05).
- Repeat with different values.

Mathematical Discourse

- *How are these two models alike? How are they different?*

  They are different ways of representing the same quantity. Both models show hundredths. Both models show a total of 5 parts (hundredths). The place-value model clearly shows 0 tenths, while the visual model does not address tenths.

- *When we wrote 6 tenths as a decimal, we did not put a 0 into the hundredths place. Why do you think we need a 0 in the tenths place when we write 5 hundredths as a decimal?*

  The zero in 5 hundredths is a place-holder so that the digit 5 is clearly in the hundredths place. Students are familiar with the need for a 0 in whole numbers. This is the same principle but applied to decimal place value.

AT A GLANCE

Students revisit the problem on page 298 and use the models shown to write a decimal in words and as an equivalent fraction. Then they apply this knowledge to other problems.

STEP BY STEP

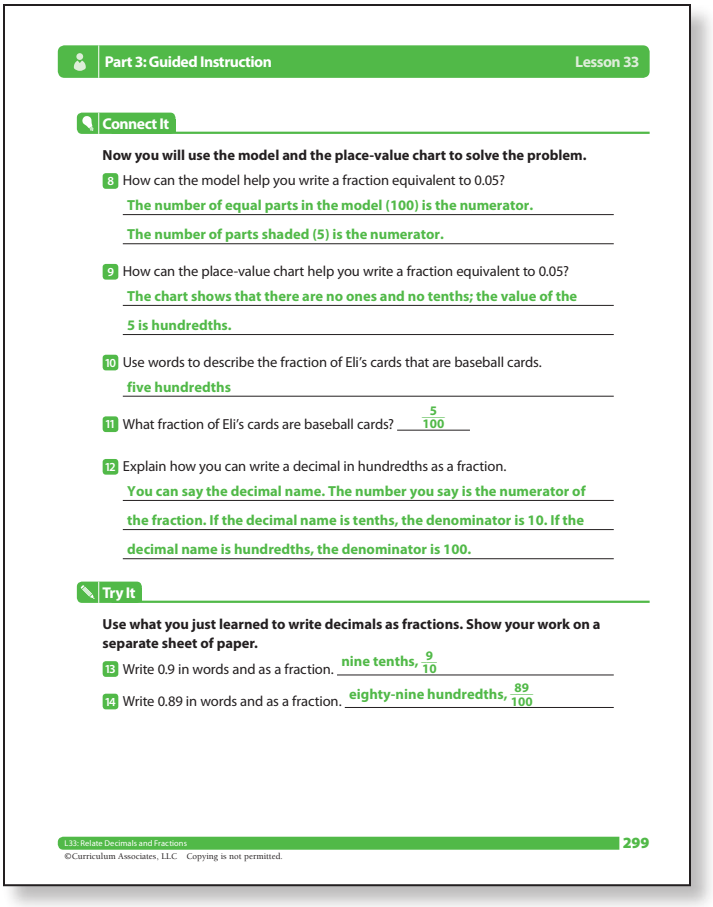
- Remind students that Connect It refers to the problem on page 298.
- Discuss problems 8 and 9 as a class. Students' understanding of these two questions provides the foundation for their work with fractions and decimals.
- Have students say the answer to problem 10 out loud.
- For problem 11, have them write the fraction they just heard.
- Discuss students' responses to problem 12. Point out that it is helpful to have a way to write a decimal in fraction form without having to draw a visual model or a place-value chart every time. Encourage students to use the name of the decimal to help them write the fraction.
- Have students complete Try It on their own.

Hands-On Activity

Practice recognizing equivalent quantities as words, fractions, and decimals.

Materials: cards, markers

- Have students make sets of three cards for several quantities (tenths or hundredths). One card shows the quantity as a fraction, one as a decimal, and one in words. [Example: $\frac{12}{100}$, 0.12, twelve hundredths.]
- Students put their cards together in a deck, shuffle, and lay out the cards out face down.
- Students play a memory game. They take turns turning over 3 cards at a time. If the set does not match, turn them face down. If the set matches, keeping the cards. The player who matches the most sets wins.



Part 3: Guided Instruction Lesson 33

Connect It

Now you will use the model and the place-value chart to solve the problem.

8 How can the model help you write a fraction equivalent to 0.05?
The number of equal parts in the model (100) is the numerator.
The number of parts shaded (5) is the numerator.

9 How can the place-value chart help you write a fraction equivalent to 0.05?
The chart shows that there are no ones and no tenths; the value of the 5 is hundredths.

10 Use words to describe the fraction of Eli's cards that are baseball cards.
five hundredths

11 What fraction of Eli's cards are baseball cards? $\frac{5}{100}$

12 Explain how you can write a decimal in hundredths as a fraction.
You can say the decimal name. The number you say is the numerator of the fraction. If the decimal name is tenths, the denominator is 10. If the decimal name is hundredths, the denominator is 100.

Try It

Use what you just learned to write decimals as fractions. Show your work on a separate sheet of paper.

13 Write 0.9 in words and as a fraction. nine tenths, $\frac{9}{10}$

14 Write 0.89 in words and as a fraction. eighty-nine hundredths, $\frac{89}{100}$

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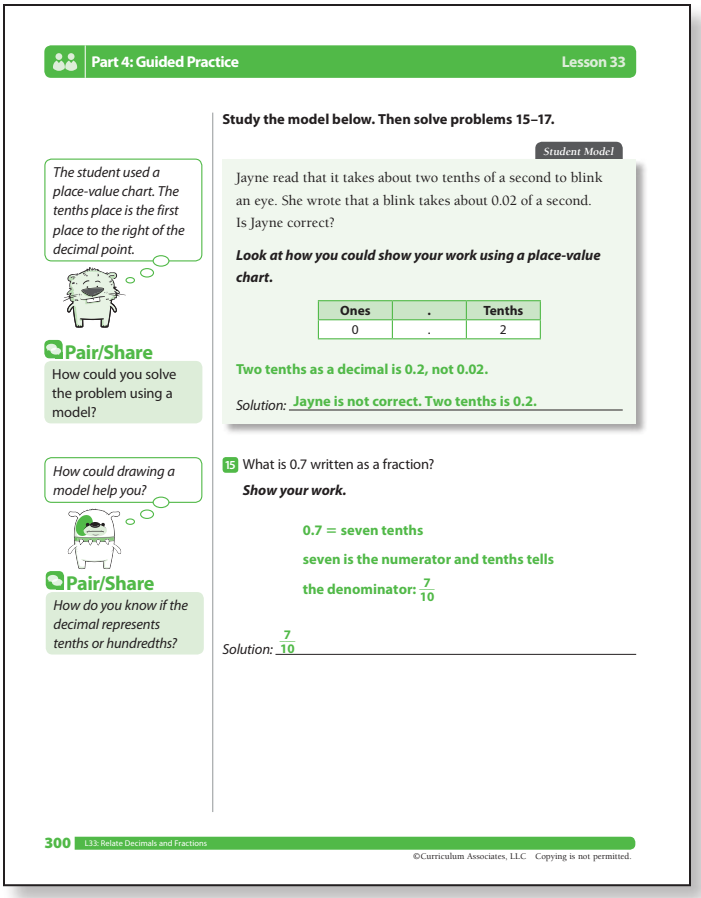
TRY IT SOLUTIONS

13 *Solution:* nine tenths, $\frac{9}{10}$; Students may say the name of the decimal out loud and then write the words. Then write 9 as the numerator and the place value as the denominator (10).

14 *Solution:* eighty-nine hundredths, $\frac{89}{100}$; Students may say the name of the decimal out loud and then write the words. Then write 89 as the numerator and the place value as the denominator (100).

ERROR ALERT: Students who wrote "zero point eight nine" may not understand how to read a decimal correctly.



Part 4: Guided Practice Lesson 33

Study the model below. Then solve problems 15–17.

The student used a place-value chart. The tenths place is the first place to the right of the decimal point.

Pair/Share
How could you solve the problem using a model?

Student Model

Jayne read that it takes about two tenths of a second to blink an eye. She wrote that a blink takes about 0.02 of a second. Is Jayne correct?

Look at how you could show your work using a place-value chart.

Ones	.	Tenths
0	.	2

Two tenths as a decimal is 0.2, not 0.02.

Solution: **Jayne is not correct. Two tenths is 0.2.**

How could drawing a model help you?

Pair/Share
How do you know if the decimal represents tenths or hundredths?

15 What is 0.7 written as a fraction?

Show your work.

0.7 = seven tenths

seven is the numerator and tenths tells

the denominator: $\frac{7}{10}$

Solution: $\frac{7}{10}$

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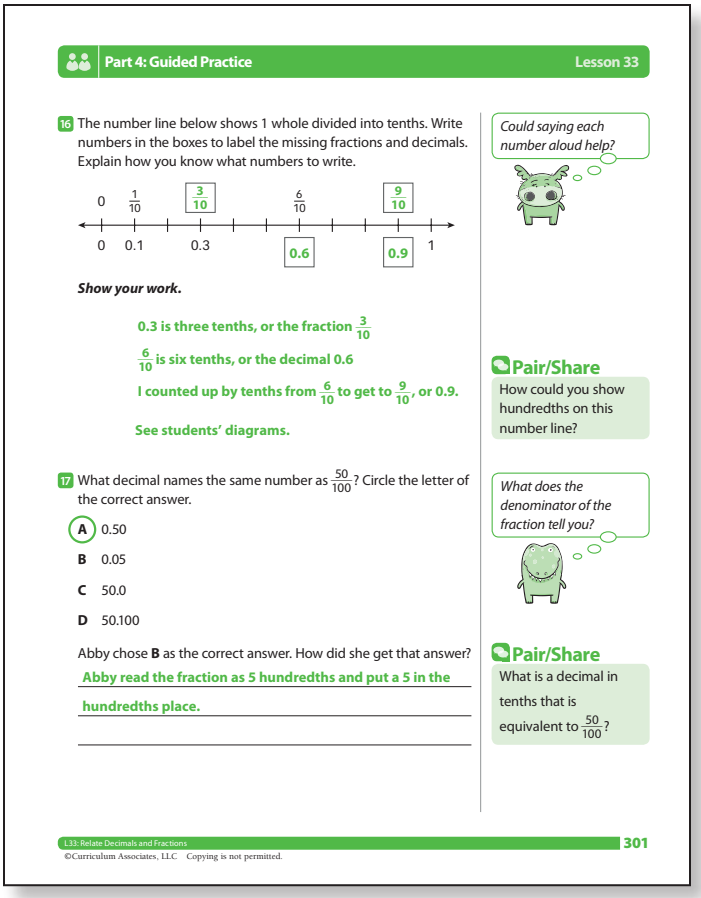

Part 4: Guided Practice Lesson 33

16 The number line below shows 1 whole divided into tenths. Write numbers in the boxes to label the missing fractions and decimals. Explain how you know what numbers to write.

Show your work.

0.3 is three tenths, or the fraction $\frac{3}{10}$

$\frac{6}{10}$ is six tenths, or the decimal 0.6

I counted up by tenths from $\frac{6}{10}$ to get to $\frac{9}{10}$, or 0.9.

See students' diagrams.

Could saying each number aloud help?

Pair/Share
How could you show hundredths on this number line?

17 What decimal names the same number as $\frac{50}{100}$? Circle the letter of the correct answer.

A 0.50
B 0.05
C 50.0
D 50.100

Abby chose **B** as the correct answer. How did she get that answer?

Abby read the fraction as 5 hundredths and put a 5 in the hundredths place.

What does the denominator of the fraction tell you?

Pair/Share
What is a decimal in tenths that is equivalent to $\frac{50}{100}$?

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AT A GLANCE

Students study a model problem that involves writing a quantity as a decimal. They work individually to solve similar problems and then share their answers and discuss.

STEP BY STEP

- Ask students to solve the problems individually. Circulate to monitor and provide support. Look for students who struggle with reading decimals or writing decimals.
- When students have completed each problem, have them Pair/Share to discuss their solutions with a partner or in a group. Encourage students to draw pictures or models as part of their Pair/Share. Have pairs tell the rest of the class about their discussion and explain any models they made.

SOLUTIONS

Ex Jayne is not correct. Two tenths is 0.2. The chart shows 0 in the ones place and 2 in the tenths place.

15 *Solution:* $\frac{7}{10}$; Students may read the decimal aloud and recognize that 7 is the numerator and 10 is the denominator.

16 *Solution:* from left to right: $\frac{3}{10}$, 0.6, $\frac{9}{10}$ and 0.9; Students may count up, and may read each value out loud to write it.

17 *Solution:* **A**; A decimal in hundredths has two digits to the right of the decimal point.

Explain to students why the other two answer choices are not correct:

C is not correct because it shows 50 wholes.

D is not correct because it is 50 and 100 thousandths.

Solve the problems. Mark your answers to problems 1–3 on the Answer Form to the right. Be sure to show your work.

Answer Form
1 Ⓐ Ⓑ ● Ⓓ
2 Ⓐ Ⓑ Ⓒ ●
3 Ⓐ Ⓑ ● Ⓓ
Number Correct ___/3

1 Which fraction and decimal are equivalent?

A $\frac{4}{10}$ and 0.04
B $\frac{6}{100}$ and 0.6
C $\frac{9}{100}$ and 0.09
D $\frac{7}{10}$ and 7.10

2 A sign on the highway says an exit is $\frac{3}{10}$ of a mile ahead. What is the decimal form of $\frac{3}{10}$?

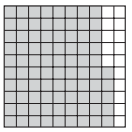
A 30.0
B 0.03
C 3.10
D 0.3

3 What is 0.75 written as a fraction?

A $\frac{.75}{100}$
B $\frac{0}{75}$
C $\frac{75}{100}$
D $\frac{75}{10}$

4 A test has 100 questions. Cora got 85 questions correct. What decimal shows the fraction of the test questions she answered correctly? What decimal shows the fraction of the test questions she answered incorrectly? Use a drawing to support your answer.

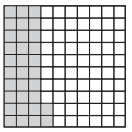
Show your work.



Answer Correct: 0.85, incorrect: 0.15

5 Kelly finds some dimes and pennies in her dad's car. She finds 5 coins in all. The coins total more than 20 cents, but less than 50 cents. What coins could Kelly have found? Write the amount as a fraction of a dollar and as an equivalent decimal. Model the fraction and decimal on the grid.

Show your work.



Possible answer: 3 dimes and 2 pennies, $\frac{32}{100}$, 0.32

Answer Kelly could have found 3 dimes and 2 pennies, $\frac{32}{100}$, 0.32.

AT A GLANCE

Students convert fractions to decimals and decimals to fractions to solve word problems that might appear on a mathematics test.

STEP BY STEP

- First, tell students that they will find equivalent decimals and fractions to solve word problems. Then have students read the directions and answer the questions independently. Remind students to fill in the correct answer choices on the Answer Form.
- After students have completed the Common Core Practice problems, review and discuss correct answers. Have students record the number of correct answers in the box provided.

SOLUTIONS

1 *Solution:* **C**; One way to find the solution is to draw a model and count the hundredths.

2 *Solution:* **D**; Say "three tenths" and use a place-value chart to find the solution.

3 *Solution:* **C**; The decimal shows the numerator. There are two places to the right of the decimal point, so the denominator is 100.

4 *Solution:* Cora got 0.85 of the questions correct and 0.15 of them wrong; If she got 85 out of 100 correct, that leaves 15 incorrect answers. 85 out of 100 means 85 hundredths. See possible student work above.

5 *Solution:* Possible answer: 3 dimes and 2 pennies, 0.32, $\frac{32}{100}$; There must be at least 3 dimes and no more than 5 dimes. The rest are pennies. See possible student work above.

Assessment and Remediation

- Ask students to write $\frac{14}{100}$ as a decimal. [0.14]
- For students who are struggling, use the chart below to guide remediation.
- After providing remediation, check students' understanding. Ask students to write 0.6 as a fraction. $\left[\frac{6}{10}\right]$
- If a student is still having difficulty, use ***Ready Instruction, Level 5***, Lesson 32.

If the error is . . .	Students may . . .	To remediate . . .
14.100	have used the decimal point as a substitute for a fraction bar.	Use a grid model to model $\frac{1}{100}$. Then demonstrate how to write $\frac{1}{100}$ as a decimal. Have students shade one hundredth at a time and write the decimals from 0.02 through 0.14. Write the equivalent fraction next to each decimal.
1.4	not know where to place the decimal point.	Write 1.4 in a place value chart. Guide students to see that this is one and four tenths. Have students use the place value chart to correctly position the digits for 14 hundredths.
0.014	think that hundredths have three digits to the right of the decimal point, just as hundreds have three digits to the left of the decimal point.	Have students draw a place-value chart showing hundreds through hundredths. Provide a grid model and have students shade $\frac{14}{100}$. Point out that the shaded column is equivalent to 1 tenth, so 14 hundredths is one shaded column plus 4 shaded squares.

Hands-On Activity

Use grid paper to model fractions and decimals.

Materials: hundred grid paper and crayons

Organize students in small groups and distribute grid paper. Have students shade 1 square on the grid paper. Mention that the total grid is 1 whole. Write the phrase out of parts. Then ask students, *How many total parts are there?* [100] *How many parts did you shade?* [1] *What decimal shows the part shaded?* [0.01] *What fraction shows the part shaded?* $\left[\frac{1}{100}\right]$ Repeat with other decimals such as 0.2, 0.45, 0.16, and 0.09.

Challenge Activity

Read, write, and model equivalent mixed numbers and decimals greater than 1.

Show students a mixed number with a denominator of 10 or 100, such as $2\frac{8}{10}$. Have students use a place value chart to write an equivalent decimal. [2.8] Show students the decimal 3.19 and an accompanying visual model (3 shaded grids, plus an additional grid with 19 out of 100 squares shaded) and have them write the equivalent mixed number. $\left[3\frac{19}{100}\right]$ Organize students in pairs and have them take turns giving each other a mixed number, a decimal greater than 1, or a visual model. Have the partner write the quantity in a different form.