



## Chapter 9

### Relate Fractions and Decimals

Thank you for purchasing this product,

Students model with mathematics as they explore, interpret, represent, and describe decimal fractions. Students use tools such as decimal squares and number lines to build relationships between decimal numbers and their corresponding fractions.

The lessons accompany and are based on Go Math textbook (4th Grade), with rich content and higher level questions. The lessons can stand on their own even if the instructors does not use Go Math, where alternative practice exercises can be utilized.

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We depend on you for ideas to improve this product. Please post your comments or concerns to make this an even better resource for you.

Thank you,  
TeacherPartner  
Nazir Ali  
nali@teacherpartner

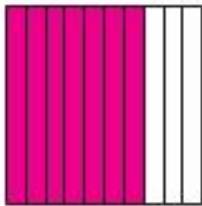
## Lesson 9.1 Relate Tenths and Decimals

Aim: How can you record tenths as fractions and decimals?

Objective: Record tenths as fractions and as decimals.

Standard: CC.4.NF.6

Vocabulary: decimal, decimal point, tenth

MOTIVATION	
<p>Share the following information with the students:</p> <p>There are three major categories for rocks: sedimentary, igneous, and metamorphic. Metamorphic rock is the result of a process that transforms, or morphs, and existing rock into another kind of rock. These rocks are under a lot of pressure and heat, and this causes them to change. The oldest rocks, most of which are metamorphic rocks, have been found in Canada and have been dated as over 4 billion years old. That's 4,000 millions years old!</p>	
MODEL/TEACH	
<p>Ty is reading a book about metamorphic rocks. He has read <math>\frac{7}{10}</math> of the book. What decimal describes the part of the book Ty has read?</p> <p>A <b>decimal</b> is a number with one or more digits to the right of the <b>decimal point</b>. You can write tenths and hundredths as fractions or decimals.</p> <p>Method: Use a model and a place-value chart</p> <p style="text-align: center;"><b>Fraction</b></p> <p>Shade <math>\frac{7}{10}</math> of the model.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>Think: The model is divided into 10 equal parts. Each part represents one <b>tenth</b>.</p> </div> </div> <p>Write: <math>\frac{7}{10}</math></p>	<p><b>Have you used the word morph? <i>Morph</i> is a shortened form of the Greek word <i>metamorphose</i>, which means "to change in shape or form."</b></p> <p>Remind students that the fraction <math>\frac{1}{10}</math> means 1 part of 10 equal parts. Explain to students that they will write fractions with a denominator of 10 and decimals that represent the same amount.</p> <p>In the following lessons, students will learn that decimals are another way to write fractions that have denominators with greater powers of ten.</p> <p>After students shade <math>\frac{7}{10}</math> of the model, ask questions about the meaning of tenths.</p> <p><b>How does the square show <math>\frac{7}{10}</math> ?</b> 7 out of 10 equal parts are shaded.</p> <p><b>How is the place-value chart similar to other</b></p>

Read: seven tenths

### Decimal

$\frac{7}{10}$  is 7 tenths.

Ones	.	Tenths	Hundredths
0	.	7	

↑ decimal point

Write: 0.7

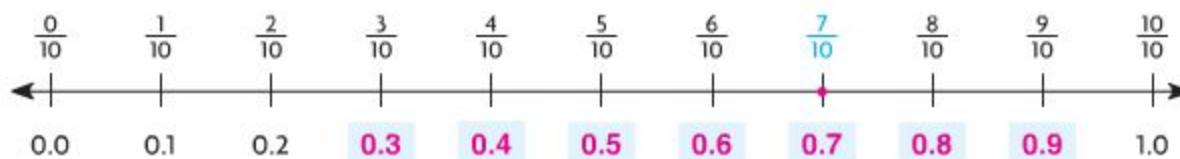
Read: seven tenths

Method: Use a number line.

Label the number line with decimals that are equivalent to the fractions. Locate the point  $\frac{7}{10}$ .

**place-value charts you have used? How is it different?** Possible answer: each place has its own column. It is different because it has a decimal point and shows decimal places.

Point out that the point  $\frac{7}{10}$  on the number line is located between 0.0 and 1.0.



0.7 name the same amount as  $\frac{7}{10}$ .

So, Ty read 0.7 of the book.

How can you write 0.1 as a fraction? Explain.  
 $\frac{1}{10}$ ; **possible explanation: the digit is in the tenths place, so 0.1 is 1 tenth or  $\frac{1}{10}$ .**

**How does the number line show that the decimal 0.7 is another way to write the fraction**

$\frac{7}{10}$ ? Possible answer: both are points located seven tenths of the distance from 0.0.

*Tell students that decimals are also called decimal fractions.*

**Explain how the size of one whole is related to the size of one tenth.** Possible explanation: the size of one whole is 10 times the size of one tenth.

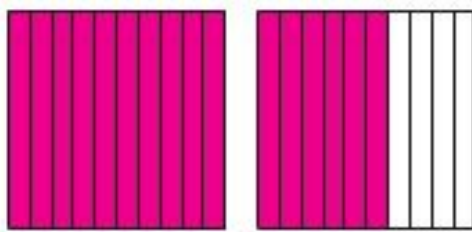
Tara rode her bicycle  $1\frac{6}{10}$  miles. What decimal describes how far she rode her bicycle?

You have already written a fraction as a decimal. You can also write a mixed number as a decimal.

Method: Use a model and place-value chart.

### Fraction

Shade  $1\frac{6}{10}$  of the model.



Write:  $1\frac{6}{10}$

Read: one and six tenths

### Decimal

$1\frac{6}{10}$  is 1 whole and 6 tenths.

Think: Use the ones place to record wholes.

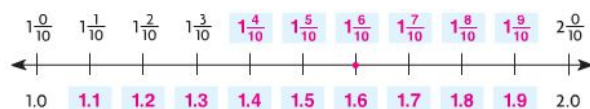
Ones	.	Tenths	Hundredths
1	.	6	

Write: 1.6

Read: one and six tenths

Method: Use a number line.

Label the number line with equivalent mixed numbers and decimals. Locate the point  $1\frac{6}{10}$ .



After students shade the model, ask about the meaning of a mixed number.

**What does  $1\frac{6}{10}$  mean?** 1 whole and 6 out of 10 part of another same-size whole.

**How do you write a decimal for a mixed number with a denominator of 10?** I write the whole number part of the mixed number to the left of the decimal point. I write the numerator of the fraction to the right of the decimal point, in the tenths place.

After students finish labeling the number line, ask questions about the meaning of the mixed numbers.

**Why is this number line labeled with mixed numbers?** Possible answer: the endpoints are 1.0 and 2.0, so the points between must be greater than 1.0 and less 2.0.

**What does the point  $1\frac{1}{10}$  represent?**

Possible answers: it is one tenth of the distance from 1. It is one and one tenth of

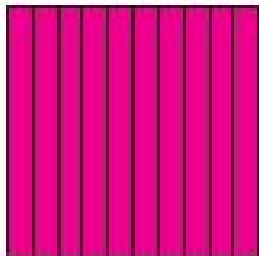
1.6 names the same amount as  $1\frac{6}{10}$ .

So, Tata rode her bicycle 1.6 miles.

Write 1 as a fraction and as a decimal.

*Possible answers are given.*

**Shade the model to show 1.**



Fraction:  $\frac{10}{10}$ , or  $\frac{1}{1}$

**1 is 1 whole and 0 tenths.**

Ones	.	Tenths	Hundredths
1	.	0	

Decimal: 1.0

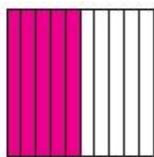
the distance from 0.

Remind students that a whole number and a fraction can name the same amount. Give the example:  $\frac{3}{3} = 1$ . Discuss with students how to write a whole as a decimal using a decimal point and a 0 in the tenths place.

## GUIDED PRACTICE

- Write five tenths as a fraction and as a decimal.

Fraction:  $\frac{5}{10}$       Decimal: 0.5



Ones	.	Tenths	Hundredths
0	.	5	

Write the fractions or mixed number and the decimal shown by the model.

2.

**How can you write  $1\frac{3}{10}$  as a decimal?**


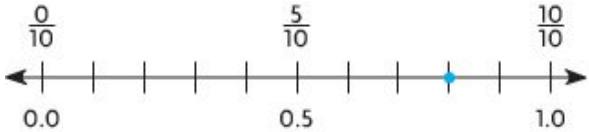
**Explain.** 1.3; possible explanation:  $1\frac{3}{10}$  is 1 whole and 3 tenths. 1 is recorded in the ones place and 3 is recorded in the tenths place.

Common Errors

Err: Students may label the number line tenths instead of mixed numbers.

Eg:



 <p><math>2\frac{2}{10}</math>      <math>2.2</math></p> <p>3.</p>  <p><math>\frac{8}{10}</math>      <math>0.8</math></p>	<p>Tip: Suggest that students draw a circle around the endpoints of a number line before they start to label it. All of the other points on the number line must be greater than the first endpoint and less than the last endpoint.</p>
INDEPENDENT PRACTICE	
Assign questions 4 thru 21, on pages 345 to 346.	
SUMMARY	
How can you record tenths as fractions and decimals?	Possible answer: fractions, mixed number, and decimals in tenths are different representations of the same amount. Tenths can be expressed as a fraction or as a decimal, such as $\frac{3}{10}$ and 0.3, or $2\frac{3}{10}$ and 2.3.
Math Journal	Does 0.3 and 3.0 have the same value? Explain.

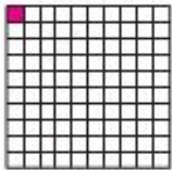
## Lesson 9.2 Relate Hundredths and Decimals

Aim: How can you record hundredths as fractions and decimals?

Objective: Record hundredths as fractions and as decimals.

Standard: CC.4.NF.6

Vocabulary: hundredth

MOTIVATION	
<p><b>Have you ever wondered how Olympic racing is scored?</b></p> <p>You may wish to share the following information with the students:</p> <p>Fabian Cancellara won the men's cycling gold medal at the 2008 Olympics in Beijing, China. His final time was 1:02:11.43. This means he finished the race in 1 hour 2 minutes 11 and 43 hundredths seconds. 11.43 seconds is almost halfway between 11 and 12 seconds. Many Olympic events, including swimming, are scored to the hundredth of a second.</p>	
MODEL/TEACH	
<p>In the 2008 Summer Olympic Games, the winning time in the men's 100-meter butterfly race was only <b><math>\frac{1}{100}</math></b> second faster than the second-place time. What decimal represent this fraction of a second?</p> <p>You can write hundredths as fractions or decimals.</p> <p>Method: Use a model and a place-value chart</p> <p style="text-align: center;"><b>Fraction</b></p> <p>Shade <math>\frac{1}{100}</math> of the model.</p> <div></div> <p>Think: The model is divided into 100 equal parts. Each part represents one hundredth.</p> <p>Write: <math>\frac{1}{100}</math></p> <p>Read: one hundredth</p>	
<p><b>Have you ever wondered how long a hundredth of a second is? A hundredth of a second is less time than it takes you to blink once.</b></p> <p>Remind students that a decimal is another way to write a fraction with a denominator of 10 or 100.</p> <p>Point out that the first digit to the right of the decimal point is the tenths digit. The second digit to the right of the decimal point is the hundredths digit.</p> <p><b>How do you know that the model shows one hundredth?</b> One out of 100 squares is shaded.</p> <p><b>What digit do you write in the ones place for a decimal that is less than 1?</b> 0</p> <p>Explain to students that the zero is written to</p>	

### Decimal

Complete the place-value chart.  $\frac{1}{100}$  is 1 hundredth.

Ones	.	Tenths	Hundredths
0	.	0	1

Write: 0.01

Read: one hundredth

Method: Use a number line.

Label the number line with equivalent decimals. Locate the point  $\frac{1}{100}$ .

the left of the decimal point to remind us to look for a decimal point.

Another Way

**How do you know that all the numbers on this number line, except 1.00, are less than 1.00?** The first endpoint is 0.00. The last endpoint is 1.00. All the points between 0.00 and 1.00 are less than 1.00.

**How many spaces in all are there between the tick marks on this number line?**

Students should count by 10s to determine there are 100 spaces in all.

Discuss with students how the model in **One Way** and the number line in **Another Way** represent the same fraction and decimal.

**Explain how the size of one tenth is related to the size of one hundredth.** Possible explanation: the size of one tenth is 10 times the size of one hundredth.



**0.01** names the same amount as  $\frac{1}{100}$ .

So, the winning time was **0.01** second faster.

Alicia won her 400-meter freestyle race by

Review the place-value chart with students.

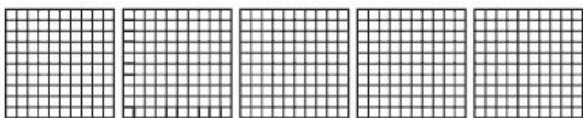


$4\frac{25}{100}$  seconds. How can you write this mixed number as a decimal?

Method: Use a model and a place-value chart.

### Mixed Number

Shade the model to show  $4\frac{25}{100}$ .



Write:  $4\frac{25}{100}$

Read: four and twenty-five hundredths

### Decimal

Complete the place-value chart.

Think: Look at the model above.  $4\frac{25}{100}$  is 4 wholes and 2 tenths 5 hundredths.

Ones	.	Tenths	Hundredths
4	.	2	5

Write: 4.25

Read: four and twenty-five hundredths

Method: Use a number line.

Label the number line with equivalent mixed numbers and decimals. Locate the point  $4\frac{25}{100}$ .

Point out how the chart includes digits in both the tenths and hundredths places.

**How do you write a decimal for a mixed number with a denominator of 100?**

I write the whole number part of the fraction to the left of the decimal point. I write the numerator of the fraction to the right of the decimal point and make sure the digits are in the correct place-value positions.

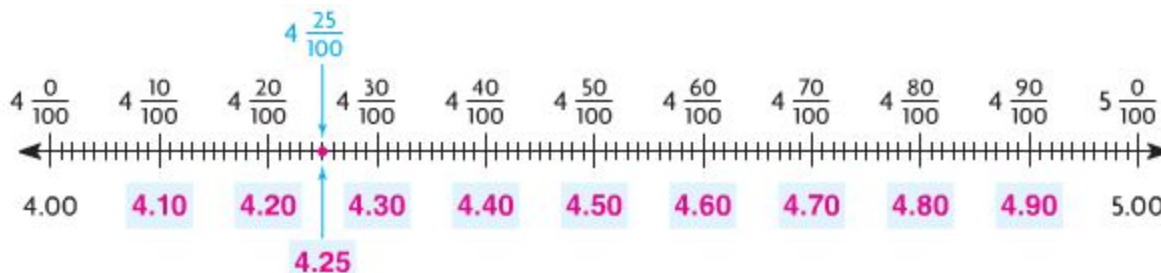
**What does four and twenty-five hundredths mean?** 4 wholes and 25 hundredths of another same-size whole.

Another Way

**All the points on this number line are between what two numbers?** The first endpoint is 4.00. The last endpoint is 5.00. All the points are between 4.00 and 5.00.

**How do you decide where  $4\frac{25}{100}$  is located?**

Since all the whole-number parts of the fractions are 4, and all the denominators are 100. I looked at the numerators. 25 is halfway between 20 and 30, so  $4\frac{25}{100}$  is halfway  $4\frac{20}{100}$  and  $4\frac{30}{100}$ .



**4.25** Names the same amount as  $4\frac{25}{100}$ .

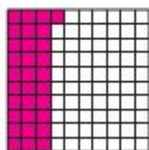
So, Alicia won her race by **4.25** seconds.

After students complete both items, ask questions about the relationship between fractions and decimals.

**Why can we write a fraction and a decimal for the same amount?** A decimal is a way to write a fraction that has a denominator of 10 or 100.

### GUIDED PRACTICE

1. Shade the model to show  $\frac{31}{100}$ .

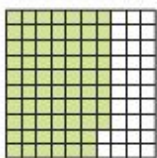


Ones	.	Tenths	Hundredths
0	.	3	1

Write the amount as a decimal. **0.31**

**Write the fraction or mixed number and the decimal shown by the model.**

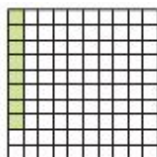
2.



$$\frac{68}{100}$$

**0.68**

3.



$$\frac{8}{100}$$

**0.08**

**Are 0.5 and 0.50 equivalent? Explain.** Yes.

Possible explanation: 0.5 is 5 tenths and 0.50 is 5 tenths 0 hundredths. Since both 0.5 and 0.50 have tenths and no hundredths, they are equivalent.

Common Errors

Err: Students write the digits in the wrong place-value position.

Eg: Write  $4\frac{60}{100}$  as a decimal.

Students write: 4.06

Tip: Use a 10 X 10 grid to show students that 6 hundredths and 60 hundredths are different amounts. Point out that the number 60, or 06, should be written to the right of the decimal point.

4.

$$6\frac{0}{100}$$

6.00

$$6\frac{19}{100}$$

**6.19**

$$6\frac{50}{100}$$

6.50

$$7\frac{0}{100}$$

7.00

### INDEPENDENT PRACTICE

Assign questions 5 thru 17, on pages 349 to 350.

SUMMARY	
How can you record hundredths as fractions and decimals?	Possible answer: fractions, mixed numbers, and decimals in hundredths are different representations of the same amount. Hundredths can be expressed as a fraction or as a decimal, such as $\frac{3}{100}$ and 0.03, or $2\frac{3}{100}$ and 2.03.
Math Journal	Describe a situation where it is easier to use decimals than fractions, and explain why.

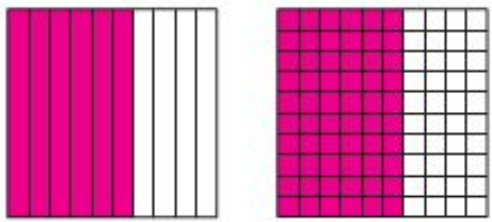
### Lesson 9.3 Equivalent Fractions and Decimals

Aim: How can you record tenths and hundredths as fractions and decimals?

Objective: Record tenths and hundredths as fractions and decimals.

Standard: CC.4.NF.6

Vocabulary: equivalent decimals

MOTIVATION	
<p>Review with student show to write an equivalent fraction by multiplying the numerator and denominator by the same number.</p> <p><b>Why do you multiply the numerator and denominator by the same number to find an equivalent fraction?</b> Possible answer: when you multiply the numerator and denominator by the same number, it is like you are multiplying by 1.</p>	<p>Have students write <math>\frac{1}{4}</math> and then multiply to find an equivalent fraction. Ask volunteers to share the fraction they found.</p>
MODEL/TEACH	
<p>Daniel spent a day hiking through a wildlife preserve. During the first hour of the hike, he drank <math>\frac{6}{10}</math> liter of water. <u>How many hundredths of a liter did he drink?</u></p> <p>One Way: Write <math>\frac{6}{10}</math> as an equivalent fraction with a denominator of 100.</p> <div style="text-align: center;"> <p><b>MODEL</b></p>  <math display="block">\frac{6}{10} = \frac{60}{100}</math> </div>	<p>Have students read and discuss the problem. Emphasize that either a fraction or a decimal representation of six tenths is correct in this problem.</p> <p>One Way  <b>By what number should you multiply the denominator of <math>\frac{6}{10}</math>? Explain your answer.</b>          10; possible explanation: I need to write <math>\frac{6}{10}</math> as a fraction with 100 in the denominator. Since <math>10 \times 10 = 100</math>, I multiply by 10.</p> <p><b>Why do you also multiply the numerator of <math>\frac{6}{10}</math> by 10?</b> To find an equivalent fraction, I need to multiply the numerator and denominator by the same number. <math>10/10 = 1</math>, so it is like multiplying by 1.</p>

**RECORD**

$$\frac{6}{10} = \frac{6 \times 10}{10 \times 10} = \frac{60}{100}$$

Another Way: Write 6/10 as a decimal.

*Think: 6 tenths is the same as 6 tenths 0 hundredths.*

Ones	.	Tenths	Hundredths
0	.	6	0

So, Daniel drank 60/100, or 0.60 liter of water.

Explain why 6 tenths is equivalent to 60 hundredths.

**Possible explanation:** *there are 10 hundredths in 1 tenth, so there are 60 hundredths in 6 tenths.*

Another way

**Explain where the tenths place is in the place-value chart.** one digit to the right of the decimal point

**Explain where the hundredths place is in the place-value chart.** two digits to the right of the decimal point.

If students are having difficulty, use the models in One Way to emphasize that 0.6 is equivalent to 0.60 because they name the same amount.

**What do you notice about the shaded area on both of the grids?** They are the same size or equal.

**Explain how you can write 0.2 as hundredths?** Possible explanation: 0.2 is 2 tenths or 2/10. Multiply the numerator and denominator by 10 to get 20/100. The equivalent decimal is 0.20.

Jasmine collected 0.30 liter of water in a jar during a rainstorm. How many tenths of a liter did she collect?

**Equivalent decimals** are decimals that name the same amount. You can write 0.30 as a decimal that names tenths.

One Way: Write 0.30 as an equivalent decimal.

Show 0.30 in the place-value chart.

Ones	.	Tenths	Hundredths
	.		

One Way

**What digit is in the hundredths place of 0.30?** 0

Discuss with students that since 0.30 has a 0 in the hundredths place, and equivalent tenths decimal can be written for it.

0	.	3	0
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*think: there are no hundredths.*

0.30 is equivalent to **3** tenths.

Write 0.30 as 0.3.

Another Way: Write 0.30 as a fraction with a denominator of 10.

Step 1 - Write 0.30 as a fraction.

0.30 is **30** hundredths.

30 hundredths written as a fraction is 30/100.

Step 2 - Write 30/100 as an equivalent fraction with a denominator.

*Think: 10 is a common factor of the numerator and the denominator.*

$$\frac{30}{100} = \frac{30 \div 10}{100 \div 10} = \frac{3}{10}$$

So, Jasmine collected **0.3**, or 3/10 liter of water.

Another Way

**How do you know what denominator to use when writing 0.30 as a fraction?** Possible answer: 0.30 means 30 hundredths, so 100 is the denominator of the equivalent fraction.

**Why do you divide 30/100 by 10/10?**

Possible answer: I divide 30/100 by 10/10 because I need to show the answer in tenths, not hundredths. Dividing by 10/10 is the same as dividing by 1, so it does not change the value.

Common Errors

Err: Students may write a zero in the tenths place rather than the hundredths place when writing an equivalent decimal.

Eg: 0.7 = 0.07

Tip: Model 0.7 and 0.07 using decimal models to illustrate that they are different decimals. Recommend that students continue to use decimal models to either find equivalent decimals or to check their work.

## GUIDED PRACTICE

1. Write  $\frac{4}{10}$  as hundredths.

Write  $\frac{4}{10}$  as an equivalent fraction.

$$\frac{4}{10} = \frac{4 \times 10}{10 \times 10} = \frac{40}{100}$$

Fraction:  $\frac{40}{100}$

Write  $\frac{4}{10}$  as a decimal.

Ones	.	Tenths	Hundredths
0	.	4	0

Decimal: 0.40

Write the number as hundredths in fraction form and decimal form.

2.  $\frac{7}{10}$

$\frac{70}{100}, 0.70$

3. 0.5

$\frac{50}{100}, 0.50$

4.  $\frac{3}{10}$

$\frac{30}{100}, 0.30$

Write the number as tenths in fraction form and decimal form.

5. 0.40

$\frac{4}{10}, 0.4$

6.  $\frac{80}{100}$

$\frac{8}{10}, 0.8$

7.  $\frac{20}{100}$

$\frac{2}{10}, 0.2$

**Can you write 0.2 as tenths? Explain.** No. Possible explanation: 0.25 is 2 tenths 5 hundredths. Since 5 hundredths is not enough to make another tenth, you cannot name 0.25 as only tenths.

#### INDEPENDENT PRACTICE

Assign questions 8 thru 22, on pages 353 to 354.

#### SUMMARY

How can you record tenths and hundredths as fractions and decimals?

Possible answer: I can write equivalent fractions and decimals using models or place value.

Math Journal


Write  $\frac{5}{10}$  in three equivalent forms.

## Lesson 9.4 Relate Fractions, Decimals and Money

Aim: How can you relate fractions, decimals and money?

Objective: Translate among representations of fractions, decimals, and money.

Standard: CC.4.NF.6

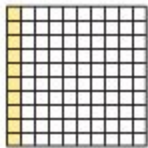
MOTIVATION	
Review the value of each coin and how to determine the value of a group of coins. Make a set of coins and have students write the value as a number of cents.	
MODEL/TEACH	
<p>Together, Julie and Sarah have \$1.00 in quarters. They want to share the quarters equally. How many quarters should each girl get? How much money is this?</p> <p>Use the model to relate money, fractions, and decimals.</p> <div data-bbox="316 1054 659 1312" style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">Remember</p> <p>1 dollar = 100 cents  1 quarter = 25 cents  1 dime = 10 cents  1 penny = 1 cent</p> </div>	<p>Review money values with students. Show them a penny, nickel, dime, quarter, and one dollar bill. Have students name the value and write the value using a dollar sign and decimal point.</p> <p>Discuss the first model with students. Emphasize the one dollar (\$1.00) is a whole, as it is equal to 100/100.</p> <p><b>Why do you think money amounts are often shown as decimals rather than fractions?</b>  Accept all reasonable answers. Possible answer: it is faster to read and write a money amount written as a decimal.</p>
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>4 quarters = 1 dollar = \$1.00</p>  </div> <div style="width: 50%;"> <p>1 quarter is <math>\frac{25}{100}</math>, or <math>\frac{1}{4}</math> of a dollar.  2 quarters are <math>\frac{50}{100}</math>, <math>\frac{2}{4}</math>, or <math>\frac{1}{2}</math> of a dollar.  <math>\frac{1}{2}</math> of a dollar = \$0.50, or 50 cents.  Circle the number of quarters each girl should get.</p> </div> </div> <p>So, each girl should get 2 quarters, or \$ <b>0.00</b>.</p>	
<p>Use money to model decimals.</p> <p style="text-align: center;">1 dollar</p>	<p>After students have examined the models, ask volunteers to explain the relationship between the models and the numbers.</p>





\$1.00 or **100** cents

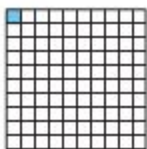
10 dimes = 1 dollar



1 dime =  $\frac{1}{10}$ , or 0.10 of a dollar

\$ **0.10**, or 10 cents

100 pennies = 1 dollar



1 penny =  $\frac{1}{100}$ , or 0.01 of a dollar

\$ **0.01**, or 1 cent

**Why is the denominator for a dime 10, while the denominator for a penny is 100?**

Possible answer: one dime is a tenth of one dollar; one penny is a hundredth of one dollar.

**If you have 68 pennies, what part of a dollar do you have? Explain.**  $\frac{68}{100}$ , 0.68 dollar.

Possible explanation: the value of 1 penny is 1 hundredth of a dollar, so the value of the 68 pennies is 68 hundredths of a dollar.

Relate Money and Decimals

Think of dollars as ones, dimes as tenths, and

Relate Money and Decimals

Review how to count a set of money to find

pennies as hundredths.

\$1.56

Dollars	.	Dimes	Pennies
1	.	5	6

*Think: \$1.56 and 56 pennies*

There are 100 pennies in 1 dollar.  
So, \$1.56 = 156 pennies.

\$1.56

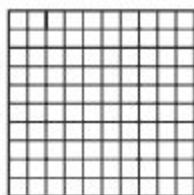
Ones	.	Tenths	Hundredths
1	.	5	6

*Think: 1.56 = 1 one and 56 hundredths*

There are 100 hundredths in 1 one.  
So, 1.56 = 156 hundredths.

the total value. Use the example at the top of the page to show the connection between dollars, dimes, and pennies with ones, tenths, and hundredths in a place-value chart.

Shade the decimal model to show the money amount. Then write the money amount and a fraction in terms of dollars.




**\$0.21**, or 21/100 of a dollar



Guide students to show the money amounts on the decimal model:

**Why do you write a decimal point in a number?** The decimal point separates the whole-number part from the decimal (fraction) part.

**Why do you write a dollar sign in front of a decimal?** The dollar sign shows that the decimal is a money amount.

**Can you write 20 cents as \$0.2?** No; money amounts are always written with two decimal places to show part of a dollar.

<div></div> <div><div><div></div></div><div><div></div></div></div>																					
\$1.46, or 46/100 dollars																					
<p>Complete the table to show how money, fractions, mixed numbers, and decimals are related.</p> <p>{see table below}</p>	<p>For the equivalence table, give students the opportunity to go to the board and write a row of equivalent fractions, decimals, and money amounts. They should explain why the numbers they wrote are equivalent.</p> <p><b>Would you rather have \$0.25 or 3/10 of a dollar? Explain.</b> 3/10 of a dollar; possible explanation: 3/10 of a dollar, or 30 cents, is more than 25 cents. 30 &gt; 25</p>																				
<table><tr><th>\$ Bills and Coins</th><th>Money Amount</th><th>Fraction or Mixed Number</th><th>Decimal</th></tr><tr><td>3 pennies</td><td>\$0.03</td><td><math>\frac{3}{100}</math></td><td>0.03</td></tr><tr><td>1 quarter</td><td>\$0.25</td><td><math>\frac{25}{100}</math>, or <math>\frac{1}{4}</math></td><td>0.25</td></tr><tr><td>2 quarters 1 dime</td><td>\$0.60</td><td><math>\frac{60}{100}</math>, or <math>\frac{6}{10}</math></td><td>0.60</td></tr><tr><td>2 \$1 bills 5 nickels</td><td>\$2.25</td><td><math>2\frac{25}{100}</math>, or <math>2\frac{1}{4}</math></td><td>2.25</td></tr></table>		\$ Bills and Coins	Money Amount	Fraction or Mixed Number	Decimal	3 pennies	\$0.03	$\frac{3}{100}$	0.03	1 quarter	\$0.25	$\frac{25}{100}$ , or $\frac{1}{4}$	0.25	2 quarters 1 dime	\$0.60	$\frac{60}{100}$ , or $\frac{6}{10}$	0.60	2 \$1 bills 5 nickels	\$2.25	$2\frac{25}{100}$ , or $2\frac{1}{4}$	2.25
\$ Bills and Coins	Money Amount	Fraction or Mixed Number	Decimal																		
3 pennies	\$0.03	$\frac{3}{100}$	0.03																		
1 quarter	\$0.25	$\frac{25}{100}$ , or $\frac{1}{4}$	0.25																		
2 quarters 1 dime	\$0.60	$\frac{60}{100}$ , or $\frac{6}{10}$	0.60																		
2 \$1 bills 5 nickels	\$2.25	$2\frac{25}{100}$ , or $2\frac{1}{4}$	2.25																		
GUIDED PRACTICE																					
<p>1. Write the amount of money as a decimal in terms of dollars.</p> <p>5 pennies = 5/100 of a dollar = <b>0.05</b> of a dollar</p> <p>Write the total money amount. Then write the amount as a fraction or a mixed number and</p>	<p><b>Explain how \$0.84 and 84/100 of a dollar are related?</b> Possible explanation: the money amount and the fraction amount both represent 84 hundredths of a dollar.</p>																				

<p>as a decimal in terms of dollars.</p> <p>2.</p>  <p>3.</p>  <p>Write as a money amount and as a decimal in terms of dollars.</p> <p>4. <math>\frac{92}{100}</math>    <b>\$0.92</b>         <b>0.92</b></p> <p>5. <math>\frac{7}{100}</math>    <b>\$0.07</b>         <b>0.07</b></p> <p>6. <math>\frac{16}{100}</math>    <b>\$0.16</b>         <b>0.16</b></p> <p>7. <math>\frac{53}{100}</math>    <b>\$0.53</b>         <b>0.53</b></p>	<p>Common Errors</p> <p>Err: Students write the incorrect number of hundredths when counting coins.</p> <p>Eg: 3 pennies = <math>\frac{30}{100}</math></p> <p>Tip: Give students 100 pennies, and let them show a dollar in pennies and then decide how to write 3 pennies as a fraction. Do the same with dimes and quarters if necessary.</p>
INDEPENDENT PRACTICE	
Assign questions 7 thru 27, on pages 357 to 358.	
SUMMARY	
How can you relate fractions, decimals and money?	Possible answer: I can write a money amount as a fraction or decimal. Money amounts are usually written as decimals because the cents are written as part of a dollar. Cents can also be written as fractions. Money amounts more than a dollar can be written as a mixed number.
Math Journal	Jeffrey says he has 6.8 dollars. How do you write the decimal 6.8 when it refers to money? Explain.

## Lesson 9.5 Problem Solving | Money


Aim: How can you use the strategy *act it out* to solve problems that use money?

Objective: Solve problems by using the strategy *act it out*.

Standard: CC.4.MD.2

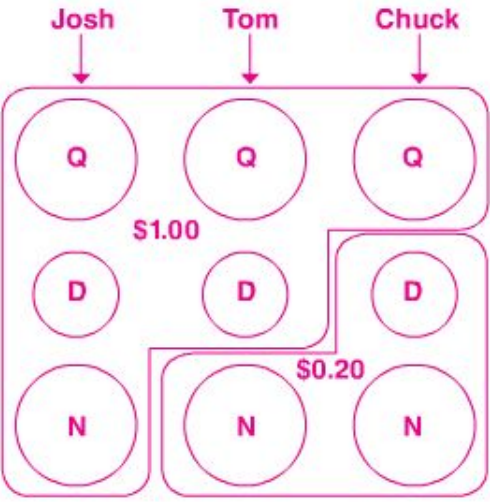
Material: coins, bills

MOTIVATION	
<p>Distribute a small amount of money (less than \$5.00) to each student. Tell students you want them to find the total amount of money.</p> <p><b>Which bill or coin will you count first?</b> Answers will vary. Students should name the bill or coin or greatest value in their set.</p>	<p>Have each students find the value of his or her set of bills and coins. Ask a few students to share how they counted on to find the total value.</p>
MODEL/TEACH	
<p>Together, Marnie and Serena have \$1.20. They want to share the money equally. How much money will each gril get?</p> <p>Use the graphic organizer to solve the problem.</p>	<p>After students read the problem, discuss how they will use the information to solve the problem using the <i>act it out</i> strategy.</p> <p>Guide students to read each question in the graphic organizer and answer it before they solve the problem.</p> <p><b>Why do you use 4 quarters instead of 1 dollar bill?</b> Possible answer: I need to share the money equally, and since I cannot tear the dollar bill in two, I need to show \$1 using coins that can be equally shared.</p> <p><b>Why can you act out the problem in more than one way?</b> Possible answer: there are different sets of coints I can use to show \$1.20 and still equally share the money.</p> <p><b>Suppose Marine and Serena had \$1.30. Could they equally share the money with 4 quarters and 3 dimes? Explain.</b> No; they would each get 2 quarters and 1 dime, but</p>

	<p>there would be a leftover dime. To equally share the dime, I would need to exchange the leftover dime for 2 nickles.</p>
<div data-bbox="207 352 812 399"> <p><b>Read the Problem</b></p> </div> <div data-bbox="224 420 812 451"> <p><b>What do I need to find?</b></p> </div> <div data-bbox="224 478 812 588"> <p>I need to find the <u>amount of money each girl gets.</u></p> </div> <hr/> <div data-bbox="224 688 812 720"> <p><b>What information do I need to use?</b></p> </div> <div data-bbox="224 747 812 861"> <p>I need to use the total amount, <u>\$1.20</u>, and divide the amount into <u>2</u> equal parts.</p> </div> <hr/> <div data-bbox="224 945 812 976"> <p><b>How will I use the information?</b></p> </div> <div data-bbox="224 1003 812 1117"> <p>I will use coins to model the <u>total amount</u> and act out the problem.</p> </div>	<div data-bbox="868 352 1427 399"> <p><b>Solve the Problem</b></p> </div> <div data-bbox="901 420 1427 525"> <p>You can make \$1.20 with 4 quarters and 2 <u>dimes</u>.</p> </div> <div data-bbox="901 556 1427 630"> <p>Circle the coins to show two sets with equal value.</p> </div> <div data-bbox="941 651 1315 1134">  </div> <div data-bbox="901 1155 1427 1270"> <p>So, each girl gets <u>2</u> quarters and <u>1</u> dime. Each girl gets \$ <u>0.60</u>.</p> </div>
<p>Describe another ay you could act out the problem with coins. <b>Possible answer: I could use 12 dimes to make \$1.20 and divide them equally into 2 groups of 6 dimes, which is \$0.60.</b></p>	<p>Have students read the problem. Then have students answer the questions in the graphic organize and solve the problem. Invite students to share how they aced out to solve the problem to solve it.</p> <p><b>How many sets of money did you show? Explain.</b> I used 3 sets, one set for each boy.</p> <p><b>How did you find how much money the boys have together?</b> Possible answer: I joined the three sets of coins. I had 3 quarters, 3 dimes, and 3 nickles. I counted to find the value of 3 quarters first: \$0.75. I then counted on the value of 3 dimes: \$1.05. Last, I countd on</p>


	<p>the value of 3 nickles: \$1.20.</p> <p><b>How would the problem be different if you used 1 quarter and 3 nickles to show each boy's money? How would it be the same?</b></p> <p>Possible answer: I would count on differently when finding the total value, but the amount of money the boys have together would be the same.</p>
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Josh, Tom, and Chuck each have \$0.40. How much money to they have together?

Read the Problem	Solve the Problem
<p><b>What do I need to find?</b></p> <p>I need to find the total amount of money the three boys have.</p>	<p>Use 1 quarter, 1 dime, and 1 nickel for each boy's money.</p> 
<p><b>What information do I need to use?</b></p> <p>I need to use the \$0.40 that each boy has.</p>	
<p><b>How will I use the information?</b></p> <p>Possible answer: I will use coins to model \$0.40 three times, once for each boy. Then I will count up the amount of money in all.</p>	<p>There are 3 quarters, 3 dimes, and 3 nickels in all. Three quarters, two dimes, and a nickel make one dollar (\$1.00). The remaining coins add up to \$0.20. The total amount is \$1.20.</p>

<p>How can you solve the problem using dimes and nickles? <i>Possible answer: I can use 3 dimes and 2 nickles for each boy's \$0.40. 9 diems and 2 nickles make \$1.00. The remaining 4 nickles make \$0.20, so the total is \$1.20.</i></p>	<p><b>What other strategy might you use to solve the problem? Explain.</b> I could use a decimal model. I could begin with 2 hundredths grids. I could shade 40 squares, next shade 40 more, and finally, shade 40 more. When I run out of squares, I go to the next grid. When I am done, I will have shaded 1 full grid and 20 squares of the second grid. This</p>
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	represents 1.20 dollars or \$1.20.
GUIDED PRACTICE	
<p>1. Juan has \$3.43. He is buying a pint brush that costs \$1.21 to paint a model race car. How much will Juan have after he pays for the paint brush?</p> <p>First, use bill and coin to model \$3.43.</p>  <p>Next, you need to subtract. Remove bills and coins that have a value of \$1.21. Mark Xs to show what you remove.</p> <p>Last, count the value of the bills and coins that are left. How much will Juan have left? <b>\$2.22</b></p> <p>2. What if Juan has \$3.43, and he wants to buy a paint brush that costs \$2.28. How much money will Juan have left then? Explain. <b><i>\$1.15; possible explanation: I can take away 2 \$1 bill and 2 dimes, but I cannot take 8 pennies from 3 pennies. I need to change 1 dime into 2 nickles to subtract 8 cents. Then I can remove 1 nickel and 3 pennies, leaving 1 bill, 1 dime, and 1 nickel.</i></b></p> <p>3. Sophia has \$2.25. She wants to give an equal amount to each of her 3 young cousins. How much will each cousin receive? <b><i>\$0.75</i></b></p>	<p>Common Errors</p> <p>Err: Students choose and model the wrong operation.</p> <p>Eg: For the earlier problem, students join two sets of \$1.20 instead of equally sharing one set of \$1.20 between two groups.</p> <p>Tip: Have students state what they need to find in order to solve each problem. Then ask them what they need to do to solve the problem: join groups, separate groups, share groups, etc. Guide students to look for clues in the word problem if they cannot determine the action to take on their own.</p>
INDEPENDENT PRACTICE	
Assign questions 4 thru 8, on page 362.	



SUMMARY	
How can you use the strategy <i>act it out</i> to solve problems that use money?	Possible answer: I can read the problem to decide what I need to find. I can then use coins to model and act out the problem to show sharing, joining, or separating the money amounts.
Math Journal	Write a money problem you can solve using sharing, joining, or separating.

## Lesson 9.6 Add Fractional Parts of 10 and 100

Aim: How can you add fractions when the denominators are 10 or 100?

Objective: Add fractions when the denominators are 10 or 100.

Standard: CC.4.NF.5

MOTIVATION	
<p>Write 0.1 on the board.</p> <p><b>Name a decimal and fraction that are equivalent to 0.1?</b> Possible answers: 0.10; 1/10</p>	<p>Then review with students what they have learned about adding fractions. Write <math>\frac{3}{4} + \frac{1}{2}</math> on the board.</p> <p><b>Can you add the fractions they are written? Explain.</b> No; I can only add fractions with like denominators, and 4 and 2 are not the same.</p>
MODEL/TEACH	
<p>The fourth grade classes are painting designs on tile squares to make a mural. Ms. Kirk's class painted <math>\frac{3}{10}</math> of the mural. Mr. Becker's class painted <math>\frac{21}{100}</math> of the mural. What part of the mural is painted?</p> <p>You know how to add fractions with parts that are the same size. You can use equivalent fractions to add fractions with parts that are not the same size.</p> <p>Find <math>\frac{3}{10} + \frac{21}{100}</math></p> <p><b>Step 1</b> - Write <math>\frac{3}{10}</math> and <math>\frac{21}{100}</math> as a pair of fractions with a common denominator.</p> <p><i>Think: 100 is a multiple of 10. Use 100 as the common denominator.</i></p> $\frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100}$ <p><b>Step 2</b> - Add</p> <p><i>Think: Write <math>\frac{3}{10} + \frac{21}{100}</math> using fraction with a common denominator.</i></p>	<p>After students read the problem, discuss how they can use what they have already learned in this chapter to rename the fractions with the same denominators.</p> <p><b>In Step 1, how do you know to multiply the denominator or <math>\frac{3}{10}</math> by 10?</b> Possible answer: <math>\frac{3}{10}</math> has a denominator of 10, and I need a denominator of 100. <math>10 \times 10 = 100</math></p> <p>In Step 2, remind students that when the denominators are the same, they add the numerators they would add whole numbers. The denominators of the sum is the same as the denominator of the addends.</p> <p><b>What is the sum of the numerators?</b> 51</p> <p>Make sure student write 51 in the numerator of the sum.</p> <p><b>When adding tenths and hundredths, you always use 100 as a common denominator? Explain.</b> Yes. Possible explanation: since 100</p>

$\frac{30}{100} + \frac{21}{100} = \frac{51}{100}$ <p>So, <math>\frac{51}{100}</math> of the mural is painted.</p>	<p>is a multiple of both 100 and 100, you can always use 100 as a common denominator when adding tenths and hundredths.</p>
<p>Find <math>\frac{4}{100} + \frac{1}{10}</math>.</p> <p>Write <math>\frac{1}{10}</math> as <math>\frac{10}{100}</math>.</p> $\frac{1}{10} = \frac{1 \times 10}{10 \times 10} = \frac{10}{100}$ <p>Add.</p> $\frac{4}{100} + \frac{10}{100} = \frac{14}{100}$ <p>So, <math>\frac{4}{100} + \frac{1}{10} = \frac{14}{100}</math></p>	<p>Have students work through the problem on their own. If students are struggling, suggest they use a decimal model to find the sum. They may also use a decimal model to check their work.</p> <p><b>What do you write 1/10 as an equivalent fraction instead of writing 4/100 as an equivalent fraction?</b> The denominators need to be the same, and I cannot write an equivalent fraction for 4/100 with a denominator of 10.</p>
<p>Add decimals.</p> <p>Sean lives 0.5 mile from the store. The store is 0.25 mile from his grandmother's house. Sean is going to walk to the store and then to his grandmother's house. How far will he walk?</p> <p>Find <math>0.5 + 0.25</math>.</p> <p>Step 1 - Write <math>0.5 + 0.25</math> as a sum of fractions</p> <p>Think: 0.5 is 5 tenths. Think: 0.25 is 25 hundredths.</p> $0.5 = \frac{5}{10} \qquad 0.25 = \frac{25}{100}$ <p>Write <math>0.5 + 0.25</math> as <math>\frac{5}{10} + \frac{25}{100}</math></p> <p>Step 2 - Write <math>5/10 + 25/100</math> as a sum of fractions with a common denominator</p>	<p>Work through the steps with students to find <math>0.5 + 0.25</math>.</p> <p><b>In Step 1, what will the denominator be for 0.5? 0.25?</b> 10; 100</p> <p><b>In Step 2, why do you need to rename 5/100?</b> In order to add the two fractions, I need to rename 5/10 as an equivalent fraction with a denominator of 100.</p> <p>If students have a strong understanding of the relationship between fractions and decimals, they may choose to write 0.5 as a fraction with a denominator of 100 without first writing it as 5/10.</p> <p>Discuss with students that when the addends are given as decimals, they should write the sum in the same form.</p> <p><b>Explain why you can think of \$0.25 as either ¼ dollar or 25/100 dollar.</b> Possible answer: \$0.25 is 25 cents or 25 pennies. There are 100 pennies in a dollar, so 25 pennies is 25/100 or a dollar. 25 pennies is 1 quarter. There are 4 quarters in a dollar, so 1 quarter is ¼ of a dollar.</p>

Think: Use 100 as a common denominator.

Rename  $\frac{5}{10}$ .

$$\frac{5}{10} = \frac{5 \times 10}{10 \times 10} = \frac{50}{100}$$

Write  $\frac{5}{10} + \frac{25}{100}$  as  $\frac{50}{100} + \frac{25}{100}$ .

Step 3 - Add.

$$\frac{50}{100} + \frac{25}{100} = \frac{75}{100}$$

Step 4 - Write the sum as a decimal.

$$\frac{75}{100} = 0.75$$

So, Sean will walk **0.75** mile.

Find  $\$0.25 + \$0.40$ .

$$\$0.25 + \$0.40 = \$0.65$$

Remember

A money amount less than a dollar can be written as a fraction of a dollar.

Have students work through the problem on their own. Point out that since both decimals have the same number of decimal places, the renamed fractions will have the same denominator. Then, students can add the fractions.

**Why do you write \$0.65 instead of 65/100 as the sum?** Possible answer: the problem is about adding two money amounts given in decimal form, so I show the sum as a money amount in decimal form.

## GUIDED PRACTICE

1. Find  $\frac{7}{10} + \frac{5}{100}$ .

Think: Write the addends as fractions with a common denominator.

$$\frac{70}{100} + \frac{5}{100} = \frac{75}{100}$$

Common Errors

Err: Student rename decimals as fractions, but they add fractions that do not have the same denominator.

Eg:  $0.2 + 0.13 = \frac{2}{10} + \frac{13}{100} = \frac{15}{100}$

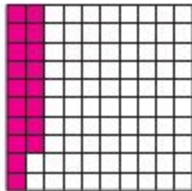
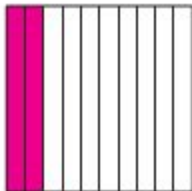

<p><b>Find the sum.</b></p> <p>2. <math>\frac{1}{10} + \frac{11}{100} = \underline{\frac{21}{100}}</math></p> <p>3. <math>\frac{36}{100} + \frac{5}{10} = \underline{\frac{86}{100}}</math></p> <p>4. <math>\\$0.16 + \\$0.45 = \\$ \underline{0.61}</math></p> <p>5. <math>\\$0.08 + \\$0.88 = \\$ \underline{0.96}</math></p>	<p>Tip: Have students use decimal model to act out the problems to check their sums. Students will see that the amount shaded does not match the sum they found. Emphasize to students that the first step they should always take before adding fractions is to check that the denominators are the same.</p>
INDEPENDENT PRACTICE	
Assign questions 6 thru 18, on pages 367 to 368.	
SUMMARY	
How can you add fractions when the denominators are 10 or 100?	Possible answer: I can write both fractions as fractions with denominators of 100. Then I add the numerators and write the denominator.
Math Journal	Explain how you would use equivalent fractions to solve $0.5 + 0.10$ .


## Lesson 9.7 Compare Decimals

Aim: How can you compare decimals?

Objective: Compare decimals to hundredths by reasoning about their size.

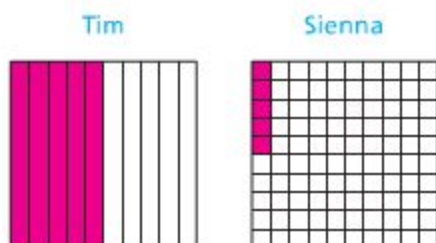
Standard: CC.4.NF.7

MOTIVATION	
<p>Write <math>&gt;</math>, <math>&lt;</math>, and <math>=</math> on the board, and review the meaning of each symbol with students.</p> <p>Then use black model <math>\frac{4}{10}</math> and <math>\frac{8}{10}</math>.</p> <p><b>How can you compare the fractions?</b> Possible answer: I can compare the models to 1 whole by aligning the left sides of the models. The longer model is the greater fraction.</p>	<p>Have students apply their strategies to compare the fractions and insert the symbol for <i>is less than</i> between the fractions to show the comparison.</p>
MODEL/TEACH	
<p><del>The city park covers 0.64 square mile.</del> About <u>0.18</u> of the park is covered by water, and about <u>0.2</u> of the park is covered by paved walkways. Is more of the park covered by water or paved walkways?</p> <ul style="list-style-type: none"> <li>● Cross out unnecessary information.</li> <li>● Circle numbers you will use.</li> <li>● What do you need to find? <b><i>If more of the park is covered by water or paved walkways</i></b></li> </ul> <p>One Way: Use a model.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>Shade 0.18.</p>  <p>0.18</p> </div> <div style="text-align: center;"> <p>Shade 0.2.</p>  <p>0.2</p> </div> </div> <div style="text-align: center; margin-top: 10px;">  </div>	<p>After students have read the problem, discuss different strategies they could use to solve the problem. Remind them that decimals and fractions are related, so they can use strategies to compare decimals that are similar to those used compare fractions.</p> <p><b>How can you tell which decimal is less using the models?</b> The model with fewer shaded columns shows the lesser number.</p>

<p>Other Ways:</p> <p>A. Use a number line.</p> <p>Locate 0.18 and 0.2 on a number line.</p> <p><i>Think: 2 tenths is equivalent to 20 hundredths</i></p>  <p><b>0.18</b> is closer to 0, so <math>0.18 &lt; 0.2</math>.</p> <p>B. Compare equal-size parts.</p> <ul style="list-style-type: none"> <li>● 0.18 is <b>18</b> hundredths.</li> <li>● 0.2 is 2 tenths, which is equivalent to <b>20</b> hundredths.</li> </ul> <p>18 hundredths <math>&lt;</math> 20 hundredths, so <math>0.18 &lt; 0.2</math></p> <p>So, more of the park is covered by <b>paved walkways</b>.</p>	<p>Explain that a number line can also be used to compare decimals. Just as with whole numbers and fractions, a decimal closer to 0 is less than another decimal.</p> <p>After working through Part A with students, remind them that they have used benchmark fractions to compare fractions. Draw a number line from 0 to 1 on the board, and divide it into ten equal parts. Work with students to write the benchmark fractions as decimals (0.0, 0.5, and 1.0), and ask students to use the benchmarks to compare 0.4 and 0.78.</p> <p><b>How do the benchmarks help you compare the decimals?</b> Possible answer: I know 0.4 is less than 0.5 and 0.78 is close to 1.0, so I can tell that 0.4 is less than 0.78.</p> <p>Before starting Part B, review the size of a tenth and a hundredth using a decimal model. Discuss with students that when comparing decimal amounts, the comparison is only valid when the decimals represent parts of the same-size wholes.</p> <p><b>How does the number of tenths in 0.18 compare to the number of tenths in 0.2?</b>  <b>Explain.</b> Possible explanation: 0.18 has 1 tenth and 0.2 has 2 tenths. The number of tenths in 0.18 is less than the number of tenths in 0.2.</p>
<p>Place Value</p> <p>You can compare numbers written as decimals by using place value. Comparing decimals is like comparing whole numbers. Always compare the digits in the greatest place-value position first.</p>	<p>Make sure students know the place-value positions without using a place-value chart. Students should be able to recognize decimals to hundredths.</p>
<p>Example: Use place value.</p>	<p><b>How do the models show which decimal is greater?</b> The model with the greater amount</p>

Tim has 0.5 dollar, and Sienna has 0.05 dollar. Who has more money?

Model



Record

Ones	.	Tenths	Hundredths	
0	.	5		← Tim
0	.	0	5	← Sienna

Think: The digits in the ones place are the same. Compare the digits in the tenths place.

5 tenths > 0 tenths, so  $0.5 > 0.05$ .

shaded show the greater decimal.

**How do the place-value chart help you compare the money amounts?** Possible answer: I can start by comparing the digits in the place-value position farthest to the left, the ones. Since the ones digits are the same, I can compare the digits in the tenths place.  $5 > 0$ , so 0.5 is greater than 0.05.

Compare the size of 1 tenth to the size of 1 hundredth. How could this help you compare 0.5 and 0.05? Explain. **Possible explanation: 1 tenth of a whole is larger than 1 hundredth of a whole. Therefore, 5 tenths of a whole are larger than 5 hundredths of a whole, so  $0.5 > 0.05$ .**

Have students shade the tenths models to represent each fraction. Students should use their models to compare the decimals.

**Why do you need to use more than one tenths model to represent 1.3?** Possible answer: I need to shade 1 whole tenths model to represent 1, and I need the second tenths model to represent 0.3, or 3 tenths.

Compare 1.3 and 0.6. Write <, >, or =.

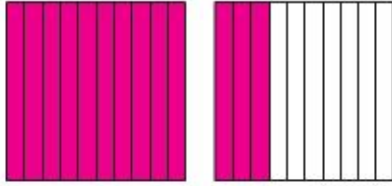
{see image below}

**Explain how you could use place value to compare 1.3 and 0.6.** Possible explanation: the greatest place value is the ones place. 1.3 has 1 one and 0.6 has 0 ones. Since  $1 > 0$  and 6 tenths is not enough to make a one,  $1.3 > 0.6$ .

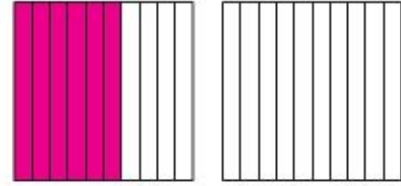


$$1.3 > 0.6$$

Shade to model 1.3.

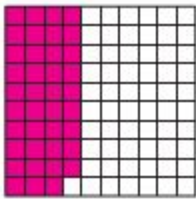


Shade to model 0.6.

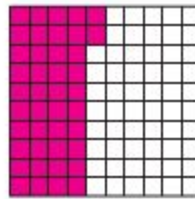


### GUIDED PRACTICE

1. Compare 0.39 and 0.42. Write  $<$ ,  $>$ , or  $=$ .  
Shade the model to help.



0.39



0.42

$$0.39 < 0.42$$

Compare. Write  $<$ ,  $>$ , or  $=$ .

2.  $0.26 > 0.23$

Ones	.	Tenths	Hundredths
0	.	2	6
0	.	2	3

3.  $0.7 > 0.54$

Ones	.	Tenths	Hundredths
0	.	7	
0	.	5	4

**Can you compare 0.3 and 0.42 by comparing only the tenths? Explain.** Yes. Possible explanation: neither number has any ones. 0.39 has 3 tenths and 0.42 has 4 tenths. Since 9 hundredths is not enough to make another tenth, 0.39 is less than 4 tenths. So,  $0.39 < 0.42$ .

#### Common Errors

Err: Students do not compare equal-size parts when comparing decimals.

Eg: Students compare 5 tenths and 18 hundredths and conclude that  $0.5 < 0.18$

Tip: Give students decimal models and have them shade to show each decimal. Elicit from students that  $0.5 = 0.50$  and 50 hundredths is greater than 18 hundredths, not less.

4.  $1.15 < 1.3$

Ones	.	Tenths	Hundredths
1	.	1	5
1	.	3	

5.  $4.5 > 2.89$

Ones	.	Tenths	Hundredths
4	.	5	
2	.	8	9

#### INDEPENDENT PRACTICE

Assign questions 6 thru 20, on pages 371 to 372.

#### SUMMARY

How can you compare decimals?

Possible answer: I can use a decimal mode to compare decimals by shading grids to show the two decimals and then determining how the decimals compare.

Math Journal

Show or describe two different ways to complete the comparison using  $>$ ,  $<$  or  $=$ ;  $0.26$  ( )  $0.4$ .