Place Value Patterns and Decimal Operations

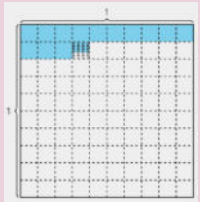
Grade 5: Unit 5

Standards addressed: 5.NBT.A.1, 5.NBT.A.3, 5.NBT.A.4, 5.NBT.B.7, 5.NF.B.4, 5.OA.A.1, 5.OA.A.2

Unit 5 Progression Overview

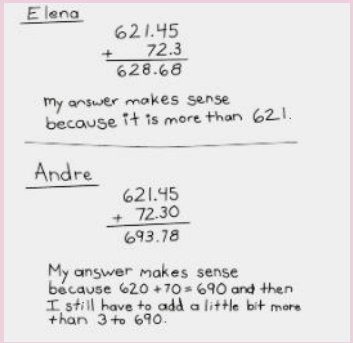
Section A
Lessons 1-8
5.NBT.A.1, 5.NBT.A.3, 5.NBT.A.4, 5.OA.A

- Compare, round and order decimals through the thousandths place based on the value of the digits in each place.
- Read, write, and represent decimals to the thousandths place, including in expanded form.



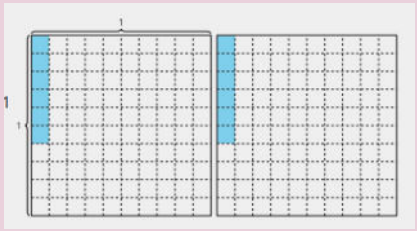
Section B
Lessons 9-14
5.NBT.B.7

- Add and subtract decimals to the hundredths using strategies based on place value



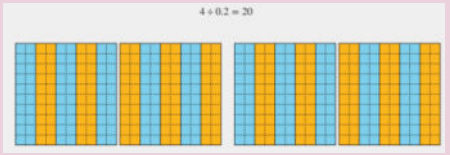
Section C
Lessons 15-19
5.NBT.A.1, 5.NBT.B.7, 5.NF.B.4, 5.OA.A.1, 5.OA.A.2

- Multiply decimals with products resulting in the hundredths using place value reasoning and properties of operations.



Section D
Lessons 20-24
5.NBT.A.3, 5.NBT.B.7

- Divide decimals with quotients resulting in the hundredths using place value reasoning and properties of operations.



Unit 5 Quick Links

Adapt 1 | Adapt 2 | Adapt 3 | Adapt 4 | Adapt 5 | Adapt 6

L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 | Adapt 7

Adapt 8 | L9 | L10 | L11 | L12 | L13 | L14 | L15 | L16

L17 | L18 | L19 | L20 | L21 | L22 | L23 | L24

Adaptation
Lesson 1

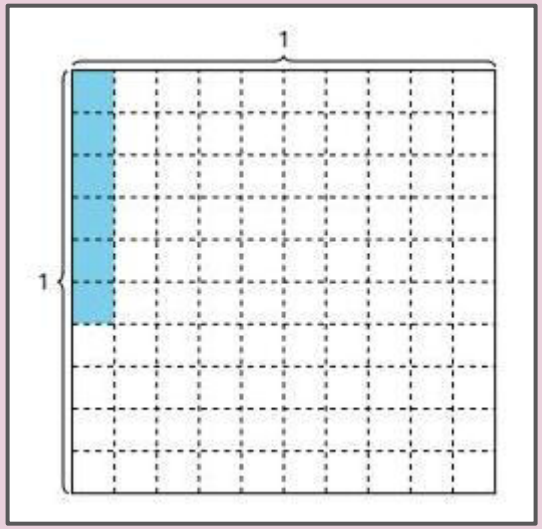
Decimal Notation

Let’s learn about decimals.

Warm up

Notice and Wonder: Shaded Grid

What do you notice?



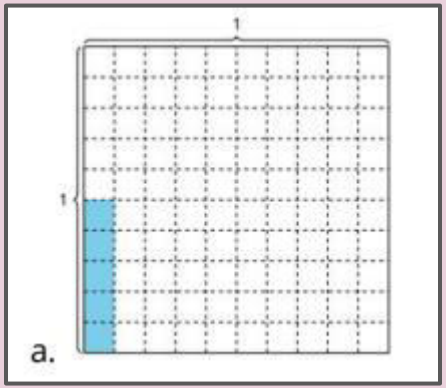
What do you wonder?

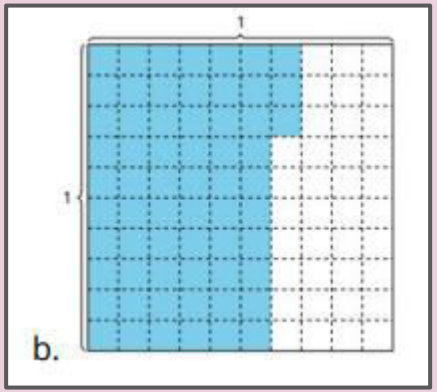
Activity #1

Shady Fractions

1. What fraction does the shaded part of each diagram represent? For the last square, shade in some parts and name the fraction it represents.

Each large square represents 1.





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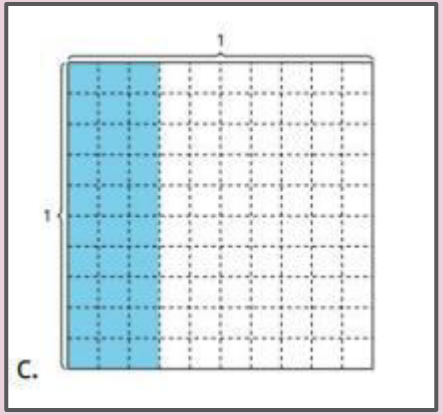

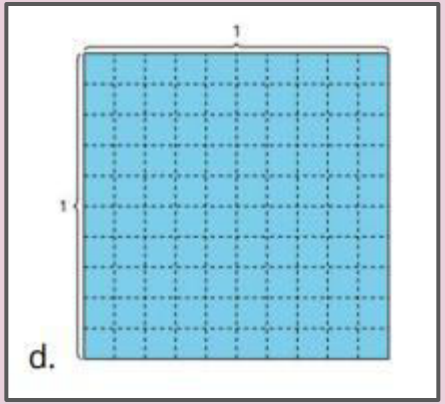

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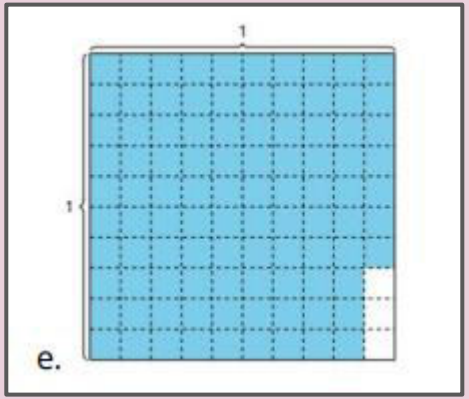
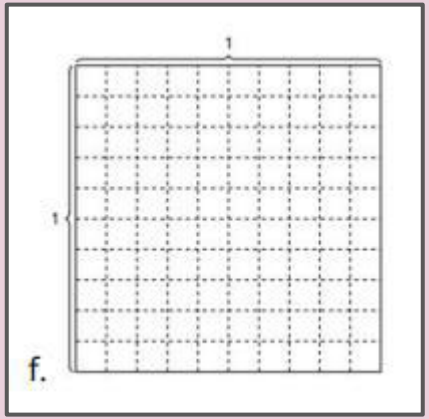
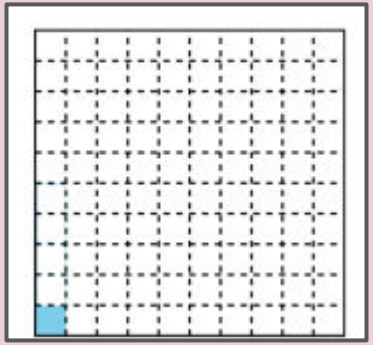


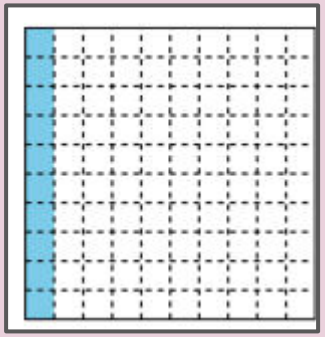


Shady Fractions

Activity #1

2. The first diagram here represents 0.01, read “1 hundredth.” The second diagram represents 0.10 or “10 hundredths.” It also represents 0.1 or “1 tenth.”





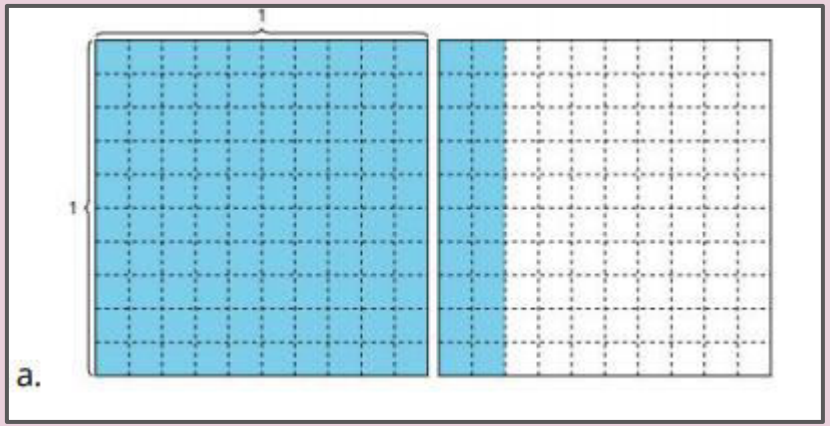
Numbers like 0.01, 0.10, and 0.1 are **decimals**.

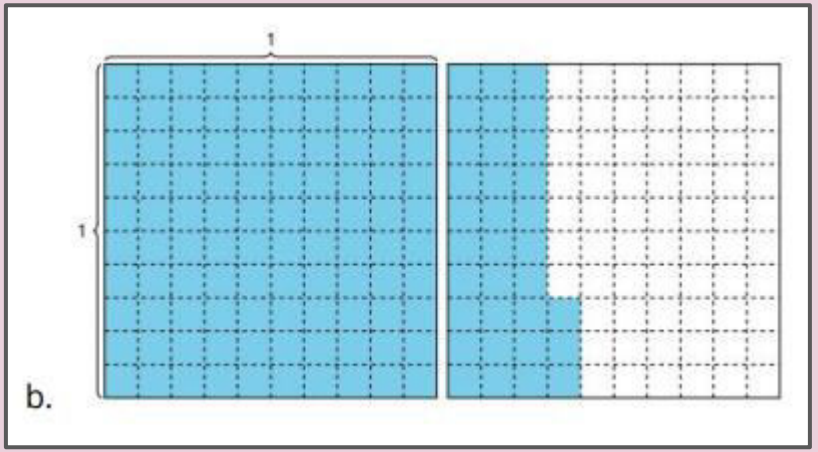
Name the decimal represented by each diagram in the first problem.

Shady Fractions

Activity #1

3. What fraction do the shaded parts of each diagram represent? What decimal do they represent?



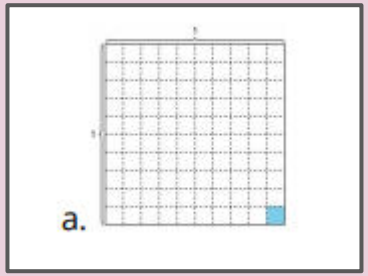


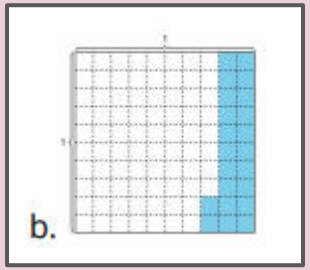
Activity #2

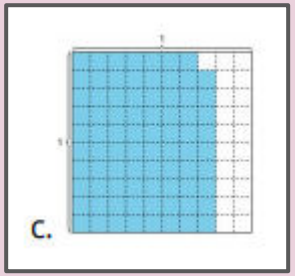
Ways to Express a Number

1. Write a fraction and a decimal that the shaded part of each diagram could represent. Then, write each amount in words.

Each large square represents 1.



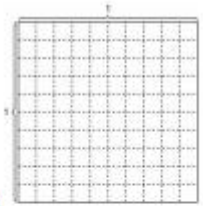




Ways to Express a Number

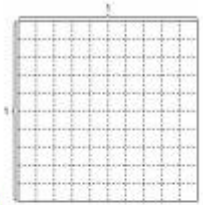
Activity #2

2. Shade each diagram to represent each given fraction or decimal.

a. 

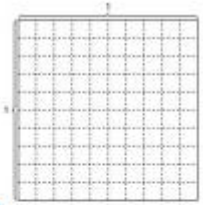
Fraction: ____

Decimal: 0.78

b. 

Fraction: $\frac{8}{10}$

Decimal: ____

c. 

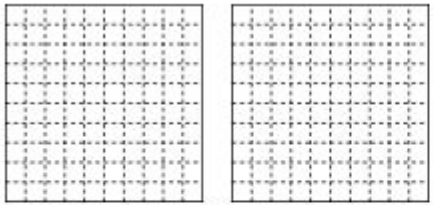
Fraction: $\frac{55}{100}$

Decimal: ____

Ways to Express a Number

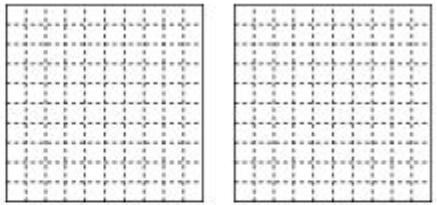
Activity #2

2. Shade each diagram to represent each given fraction or decimal.

d. 

Fraction: $\frac{107}{100}$

Decimal: _____

e. 

Fraction: _____

Decimal: 1.6

Ways to Express a Number

Activity #2

3. Han and Elena disagree about what number the shaded portion represents. Han says that it represents 0.60 and Elena says it represents 0.6.

Explain why both Han and Elena are correct.

Lesson Synthesis

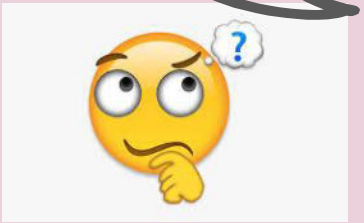
Today we learned that a fraction can be written in decimal form, regardless of whether it is less or greater than 1.

0.6 0.60

In both numbers, what does the 0 to the left of the decimal point represent?

In 0.6, what does the 6 represent?

How do we say these numbers in words?

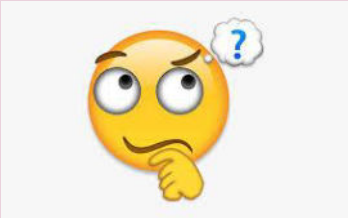


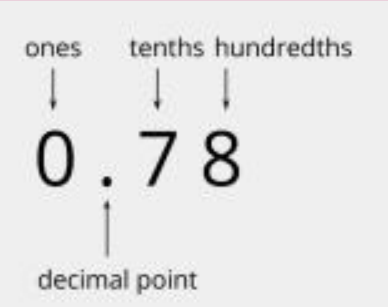
Why can we use the same diagram to represent 0.6 and 0.60?

Lesson Synthesis

0.78

Why might it make sense to name this decimal seventy-eight hundredths?





Adaptation
Lesson 2

Equivalent Decimals

Let’s think about equivalent decimals.

Warm up

True or False: Equivalent Fractions

Decide whether each statement is true or false.

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

Warm up

True or False: Equivalent Fractions

Decide whether each statement is true or false.

$$\frac{20}{10} = \frac{20}{100}$$

Warm up

True or False: Equivalent Fractions

Decide whether each statement is true or false.

$$2 = 1 + \frac{90}{100}$$

Warm up

True or False: Equivalent Fractions

Decide whether each statement is true or false.

$$3\frac{1}{10} = \frac{31}{10}$$

Card Sort: Diagrams of Fractions and Decimals

Activity #1

Your teacher will give you a set of cards.

1. Sort the cards into groups so that the representations in each group have the same value. Record your sorting decisions. Be prepared to explain your reasoning.

A $\frac{4}{10}$

B $1\frac{40}{100}$

C 0.14

D 1.40

E 1.4

F 0.40

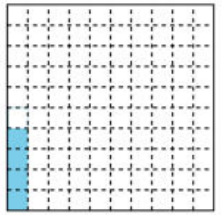
G $\frac{4}{100}$

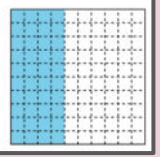
H $\frac{14}{100}$

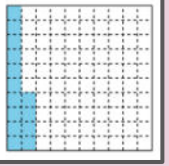
I 0.04

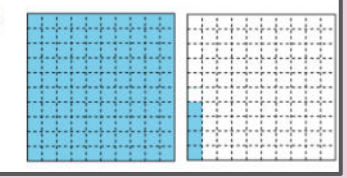
J 0.4

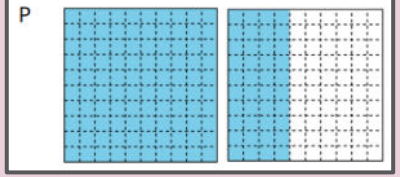
K $\frac{40}{100}$

L 

M 

N 

O 

P 

Card Sort: Diagrams of Fractions and Decimals

Activity #1

2. One of the diagrams has no matching fraction or decimal. What fraction and decimal does it represent?

A $\frac{4}{10}$

B $1\frac{40}{100}$

C 0.14

D 1.40

E 1.4

F 0.40

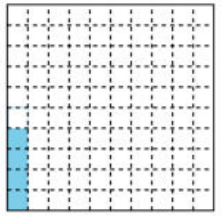
G $\frac{4}{100}$

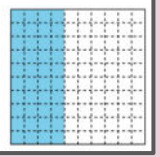
H $\frac{14}{100}$

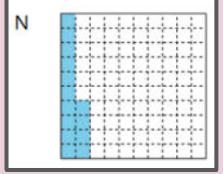
I 0.04

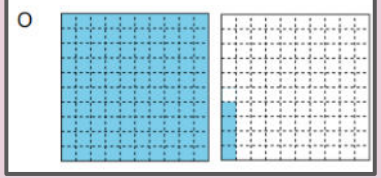
J 0.4

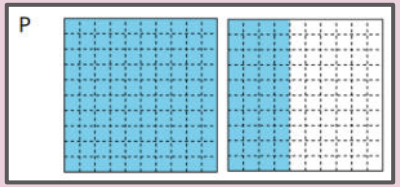
K $\frac{40}{100}$

L 

M 

N 

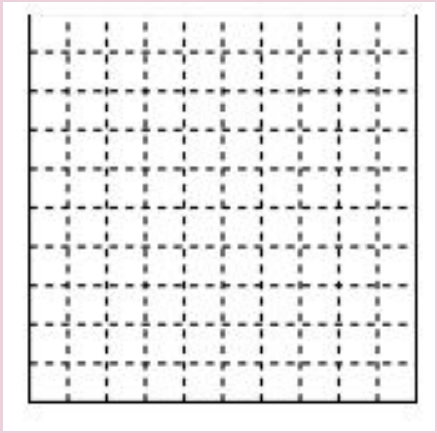
O 

P 

Card Sort: Diagrams of Fractions and Decimals

Activity #1

3. Are 0.20 and 0.2 equivalent?
Use fractions and a diagram to explain your reasoning.



True or Not True?

Activity #2

1. Decide whether each statement is true or false. For each statement that is false, replace one of the numbers to make it true. (The numbers on the two sides of the equal sign should not be identical.)

a. $\frac{50}{100} = 0.50$

b. $0.05 = 0.5$

c. $0.3 = \frac{30}{10}$

d. $0.3 = \frac{30}{100}$

e. $0.3 = 0.30$

f. $1.1 = 1.10$

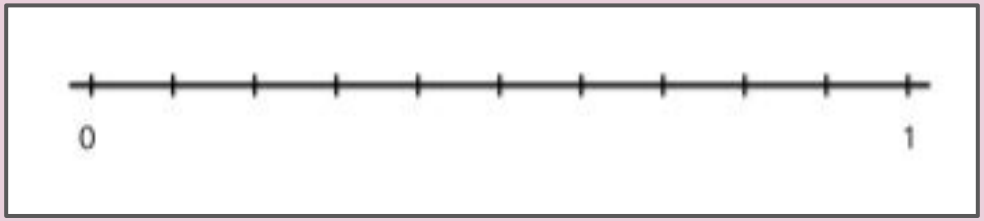
g. $3.06 = 3.60$

True or Not True?

Activity #2

2. Jada says that if we locate the numbers 0.05, 0.5, and 0.50 on the number line, we would end up with only two points.

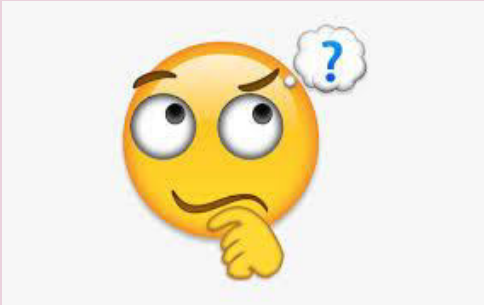
Do you agree? Explain or show your reasoning.



Lesson Synthesis

Today we looked at different ways to represent decimals that are equivalent. We used square grids, number lines, and fractions to show that two decimals can represent the same value.

Suppose a classmate is absent today. How would you convince them that 0.3 and 0.30 are equivalent? Write down at least two different ways.



Adaptation
Lesson 3

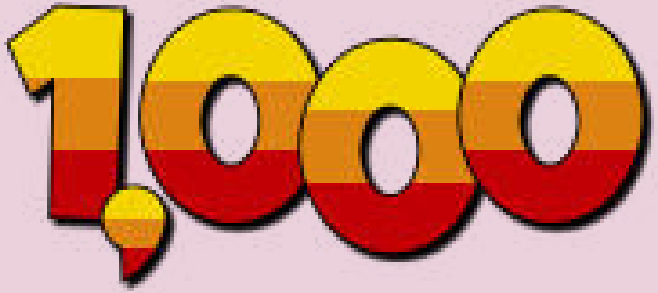
How Much is 10,000?

Let’s represent 10,000.

What do you know about 1,000?

Warm up

What do you know about....



Build Numbers

Activity #1

Your teacher will give you four cards, each with a single-digit number on it.

1. Use two cards to make a two-digit number. Name it and build the number with base-ten blocks.

2. Use a third card to make a three-digit number. Name it and build it with base-ten blocks.

3. Use a fourth card to make a four-digit number. Name it and build it. If you don't have enough blocks, describe what you would need to build the number.

Your teacher will give you one more digit card.

4. Use the last card from your teacher to make a five-digit number. Make the card the first digit. Name it and build it. If you don't have enough blocks, describe what blocks you would need to build the number.

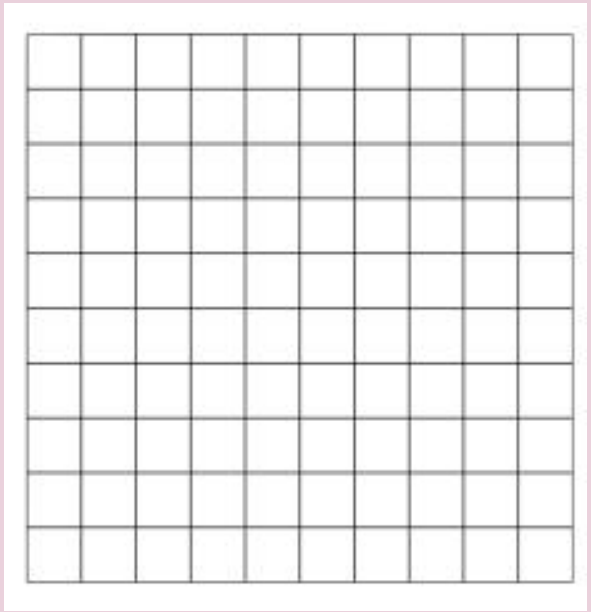
Activity #2

What is 10,000?

Your teacher will give you a set of 10-by-10 grids.

1. Use the grids to represent each of the following numbers. Then, describe or draw a sketch of each representation here.

   a. 800
   b. 1,000
   c. 1,500
   d. 2,000



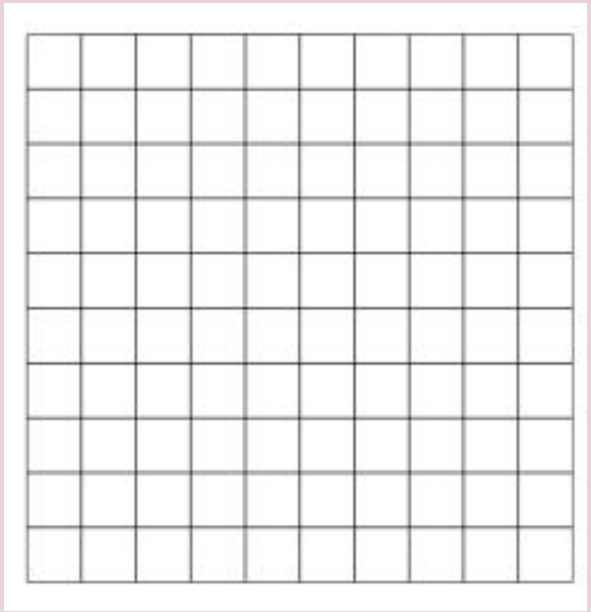
What is 10,000?

Activity #2

Your teacher will give you a set of 10-by-10 grids.

2. How many 10-by-10 grids would you need to represent each of the following numbers? Explain or draw a sketch to show your reasoning.

a. 3,000
b. 6,400
c. 9,000
d. 9,900



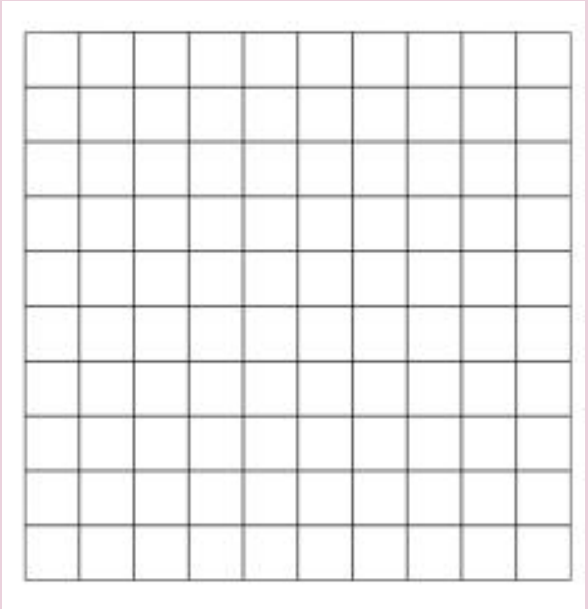
What is 10,000?

Activity #2

Your teacher will give you a set of 10-by-10 grids.

3. Draw a sketch to represent 10,000 using 10-by-10 grids.

Be sure to clearly label each group of 1,000 in the sketch.



Lesson Synthesis

Today we generated multi-digit numbers, we used blocks and a drawing to represent each multi-digit number, and we used groups of hundreds to build 10,000.

If we were going to represent a number like 13,000, how might we do this?

What do you think the next unit will be after ten thousands?

Where in this class chart do you see ten of something making a new unit?

Ten groups of 10,000 makes a new unit, 100,000. We will learn about this unit in future lessons.

Adaptation
Lesson 4

Numbers Within 100,000

Let's read, write, and represent multi-digit numbers.

Same Digit, Different Value

Let's describe the relationship between the digits in multi-digit numbers.

4.NBT.A.1 , 4.NBT.A.2

Many Thousands

Activity #1

1. Complete the table to show how many thousands are in each number. In the last row, write your own five-digit number.

2. Together with a partner, name each number in words. (Leave the last column blank for now.)

number	number of thousands	name in words	
10,000	10	ten thousand	
20,000			
90,000			
11,000			
27,000			
98,000			

3. In the top (header) row of the last column, write “number of ten thousands.” Complete the table to show how many ten-thousands are in each number.

4. Here are four numbers:

20,500 51,300 82,050 5,970

a. Which number has 5 thousands?

b. Which number has 5 ten-thousands?

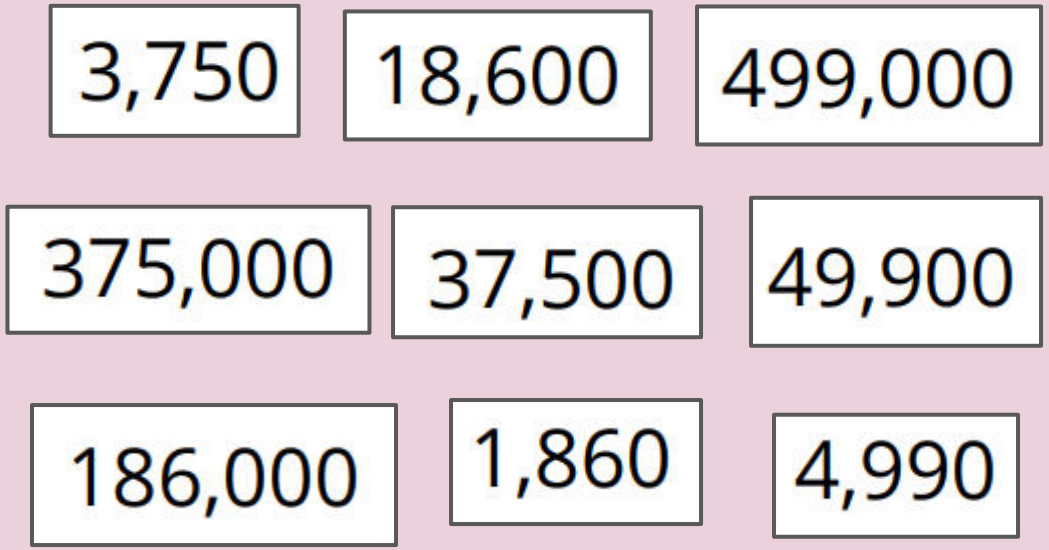
Card Sort: Large Numbers

Activity #2

Your teacher will give you and your partner a set of cards with multi-digit numbers on them.

1. Sort them in a way that makes sense to you. Be prepared to explain your reasoning.

2. Join with another group and explain how you sorted your cards.



Card Sort: Large Numbers

Activity #2

3. Write each number in expanded form.

   a. 4,620

   b. 46,200

   c. 462,000

4. Write the value of the 4 in each number.

5. Compare the value of the 4 in two of the numbers. Write two statements to describe what you notice about the values.

6. How is the value of the 2 in 46,200 related to the value of the 2 in 462,000?

Adaptation
Lesson 5

Compare Multi-digit Numbers

Let’s compare some multi-digit numbers.

Order Multi-digit Numbers

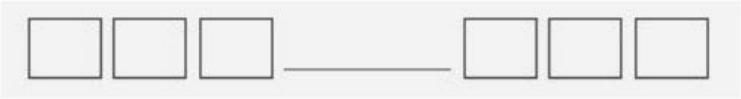
Let’s put some multi-digit numbers in order.

Which is Greater?

Activity #1

Your teacher will give you a set of cards, each with a single digit, 0–9.

1. Use the cards for 2, 7, and 8 to make two different three-digit numbers. Use < or > to compare them.



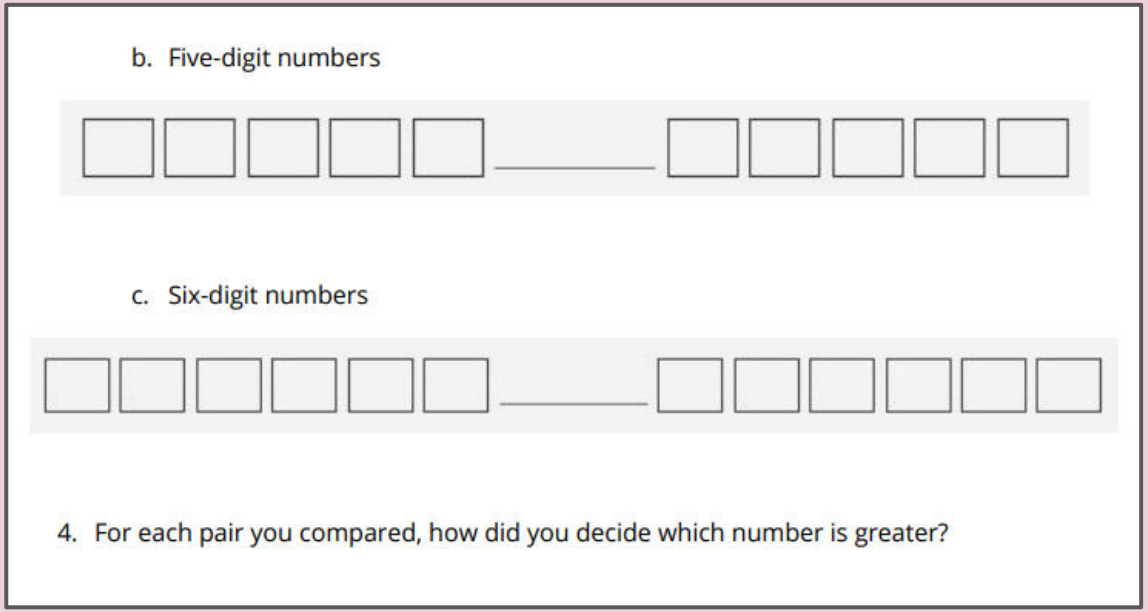
2. Now include the digit 1 to make two different four-digit numbers. Compare the numbers.

3. Shuffle the cards. Repeat what you did earlier with new cards.
   a. Four-digit numbers

Which is Greater?

Activity #1

Your teacher will give you a set of cards, each with a single digit, 0–9.



b. Five-digit numbers

c. Six-digit numbers

4. For each pair you compared, how did you decide which number is greater?

Ways to Compare

Activity #2

1. Tyler compares multi-digit numbers by looking at the first digit from the left.

   He says, "The greater the first digit, the greater the number. If the first digit is the same, then we compare the second digit."

   Is the number with the greater first digit also the greater number in each of these pairs?

   a. 985,248 and 320,097
   b. 72,050 and 64,830
   c. 320,097 and 58,978
   d. 54,000 and 587,000
   e. 58,978 and 547,612
   f. 146,001 and 1,483

Ways to Compare

Activity #2

2. Does Tyler's strategy work for comparing any pair of numbers? Is it reliable? Explain your reasoning.

3. How would you compare multi-digit numbers? Describe your strategy for comparing 54,000 and 587,000.

Ways to Compare

Activity #2

4. Use your strategy to order these numbers from least to greatest.

   a. 87,696 847,040 84,381

   b. 63,591 630,951 63,951 631,051

Adaptation
Lesson 5

Multiples of 1,000, 10,000 and 100,000

Let's explore multiples of 1,000, 10,000, and 100,000 and how other numbers relate to them.

Round Numbers Within a Million

Let's round some large numbers.

On Which Line Do They Belong?

Activity #1

Your teacher will assign a set of numbers to you.

A	140,261	100,025	486,840	676,850
B	450,099	414,500	128,201	379,900
C	158,002	42,326	99,982	438,950
D	194,030	658,340	541,700	621,035
E	215,300	499,600	608,720	644,700

1. Several number lines are posted around the room. Work with your group to decide on which number line each number should go.

Then, estimate the location of the number on that line, put a dot sticker to mark it, and label it with the number.

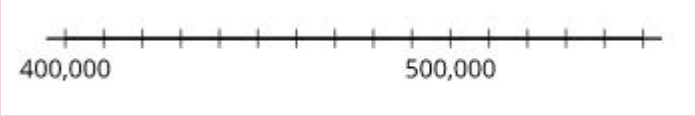
2. Look at the number line that represents 0 to 100,000 and has two points on it.

a. Name two multiples of 10,000 that are closest to each point.
b. Of the two multiples of 10,000 you named, which one is the nearest to each point?

Round to What?

Activity #2

Noah says that 489,231 can be rounded to 500,000. Priya says that it can be rounded to 490,000.



1. Estimate the location of 489,231 on the number line. Then, use your number line to help explain why both Noah and Priya are correct.

2. Describe all the numbers that would round to 500,000 if we were rounding to the nearest 100,000.

3. Describe all the numbers that would round to 490,000 if we were rounding to the nearest 10,000.

4. Name two other numbers that can also be rounded to both 500,000 and 490,000

1

What is 1 Thousandth?

Let’s read, write, and represent decimals.

5.NBT.A, 5.NBT.A.1

Warm up

Choral Count: Tenths and Hundredths

What patterns do you see?

Count by $\frac{1}{10}$ starting at $\frac{1}{10}$.

Stop counting at $\frac{15}{10}$.

Warm up

Choral Count: Tenths and Hundredths

Count by $\frac{1}{100}$, starting at $\frac{1}{100}$.

Stop counting at $\frac{25}{100}$.

What patterns do you see?

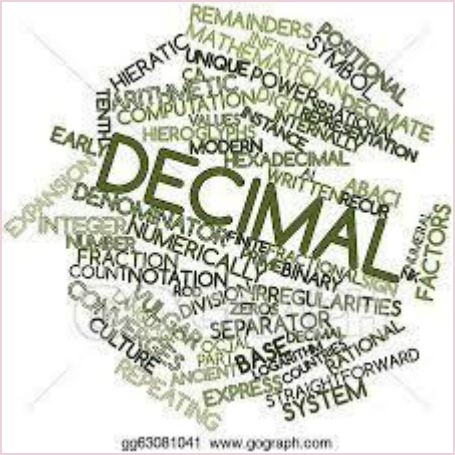
What Do you Know About Thousandths?

Activity #1

1. What do you know about 1 tenth?

2. What do you know about 1 hundredth?

3. What do you know about 1 thousandth?

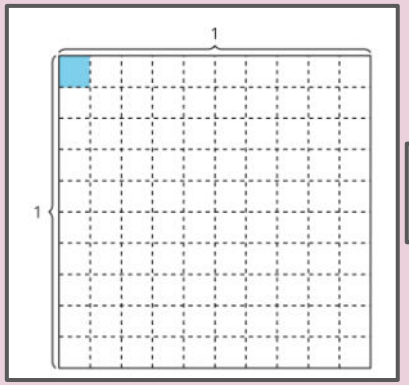


Represent Numbers on a Grid

Activity #2

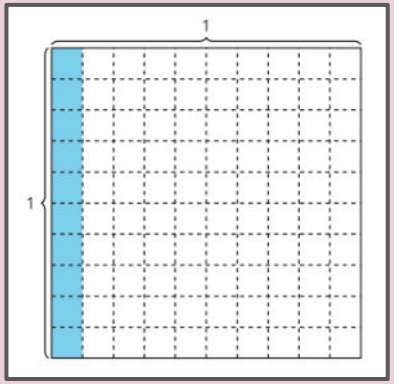
1. The large square grid represents 1.

What does each small square represent? Explain or show your reasoning.



2. The large square grid represents 1.

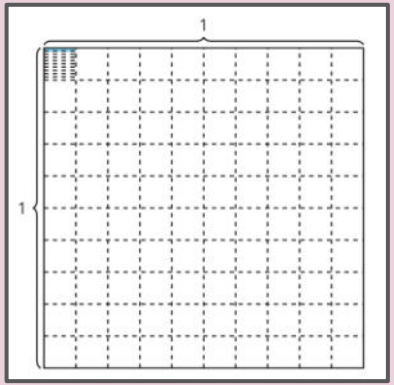
What is the value of the shaded region? Explain or show your reasoning.

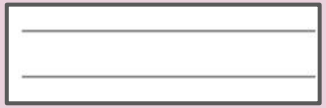


Represent Numbers on a Grid

Activity #2

3. How many of the small rectangular pieces (one of them is shaded) are there altogether in the entire unit square? Explain or show your reasoning.



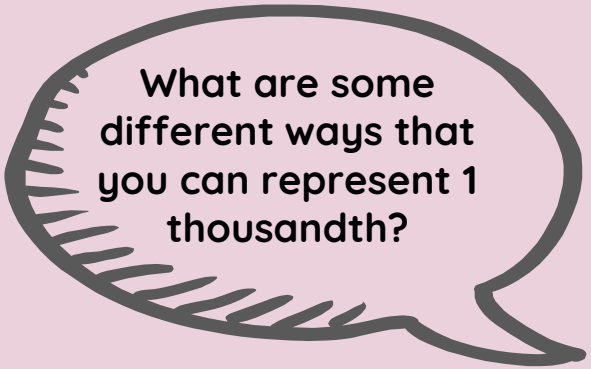


4. How do you think we write the number 1 thousandth as a decimal? Explain your reasoning.

Fraction	Decimal
$\frac{1}{10}$	0.1
$\frac{1}{100}$	0.01
$\frac{1}{1000}$	?

Lesson Synthesis

Today we represented 1 tenth, 1 hundredth, and 1 thousandth in different ways. What are some different ways that you can represent 1 hundredth?



2

Thousandths on Grids and in Words

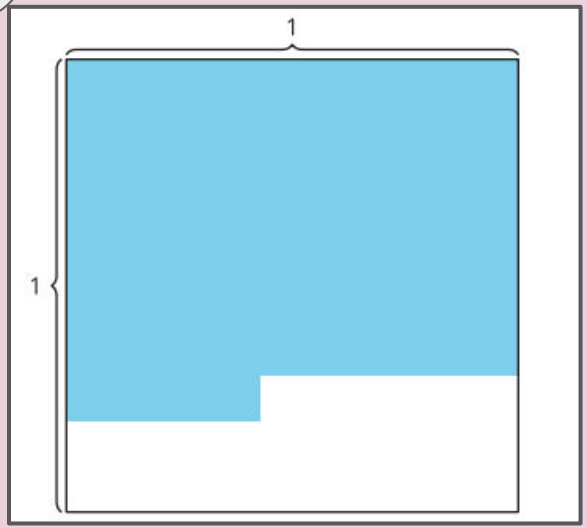
Let’s read, write, and represent decimals.

5.NBT.A, 5.NBT.A.3

Warm up

Estimation Exploration: What Part of the Square is Shaded?

How much of the square is shaded?



Record an estimate that is:

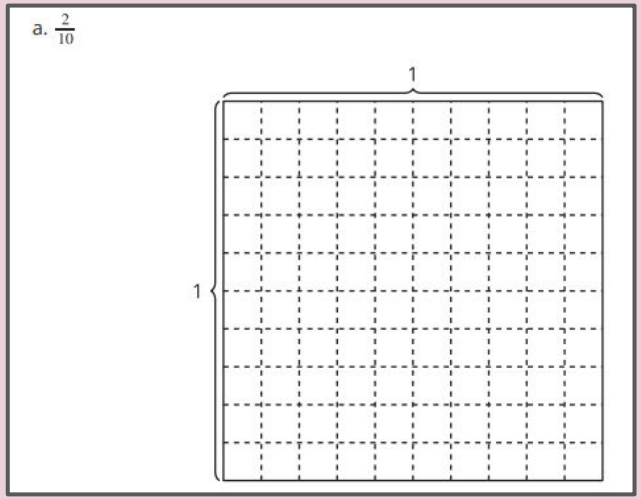
Too low	About right	Too high

Represent Thousandths on a Grid

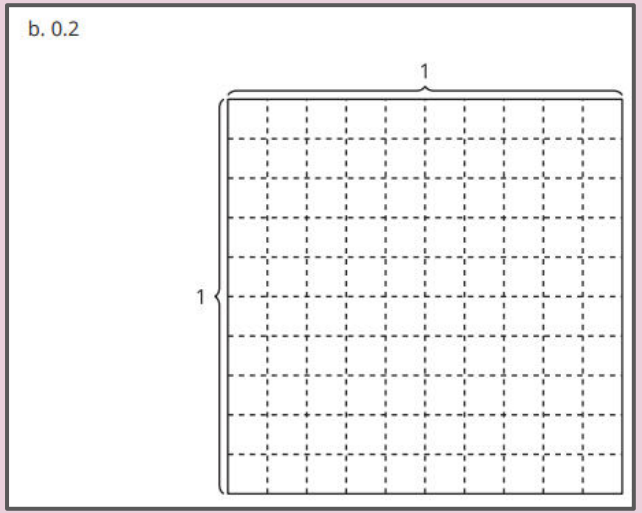
Activity #1

1. Represent each number on a grid.

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



b. 0.2

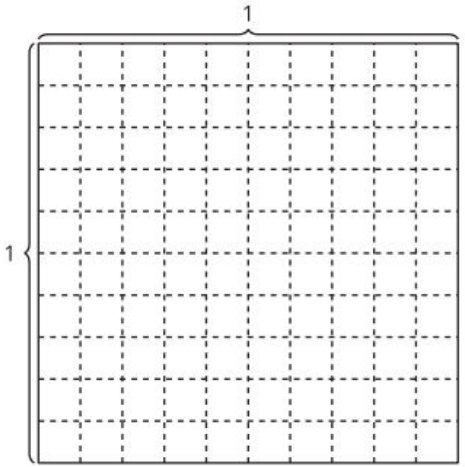


Represent Thousandths on a Grid

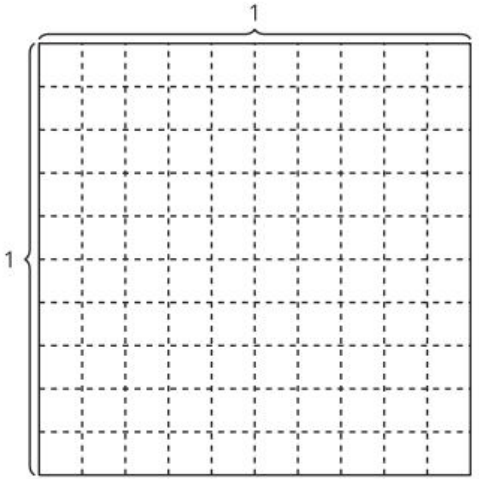
Activity #1

1. Represent each number on a grid.

c. $\frac{15}{100}$



d. 0.34

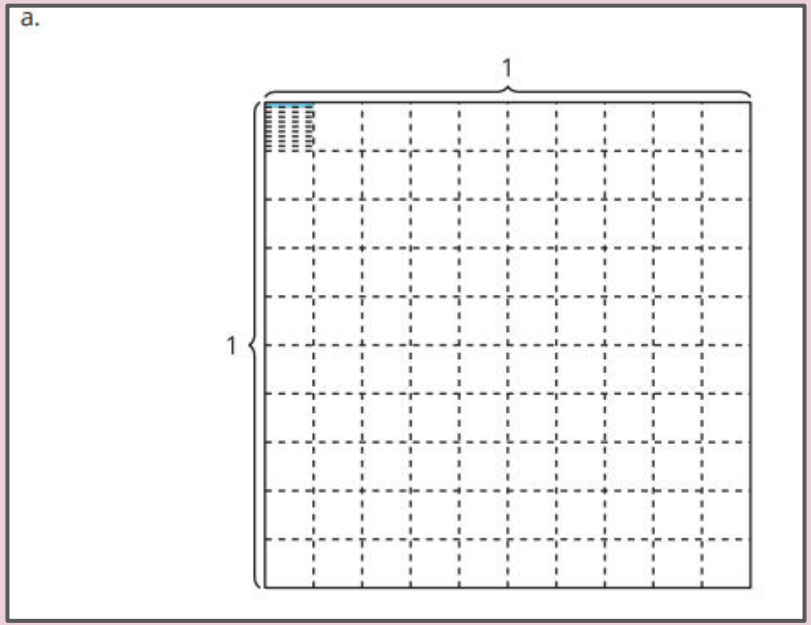


Represent Thousandths on a Grid

Activity #1

2. For each diagram, write a decimal number to represent how much is shaded. Explain or show your reasoning.

a.

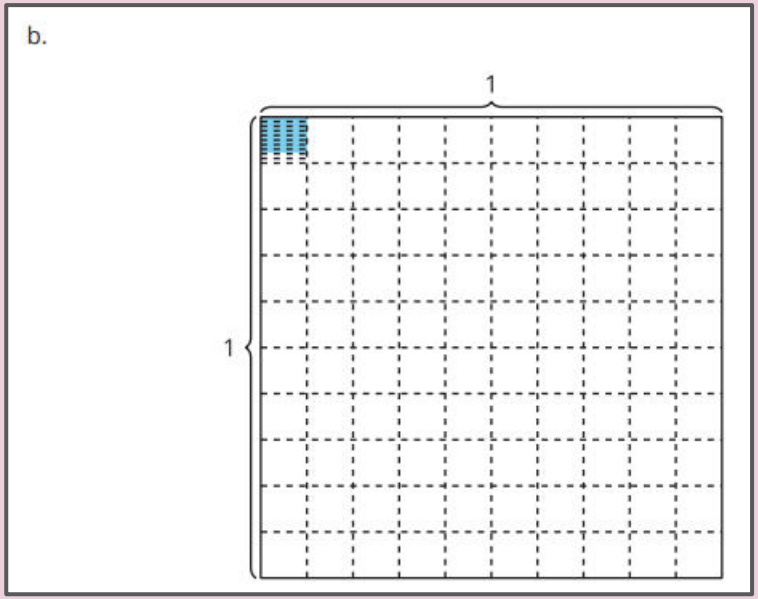


Represent Thousandths on a Grid

Activity #1

2. For each diagram, write a decimal number to represent how much is shaded. Explain or show your reasoning.

b.

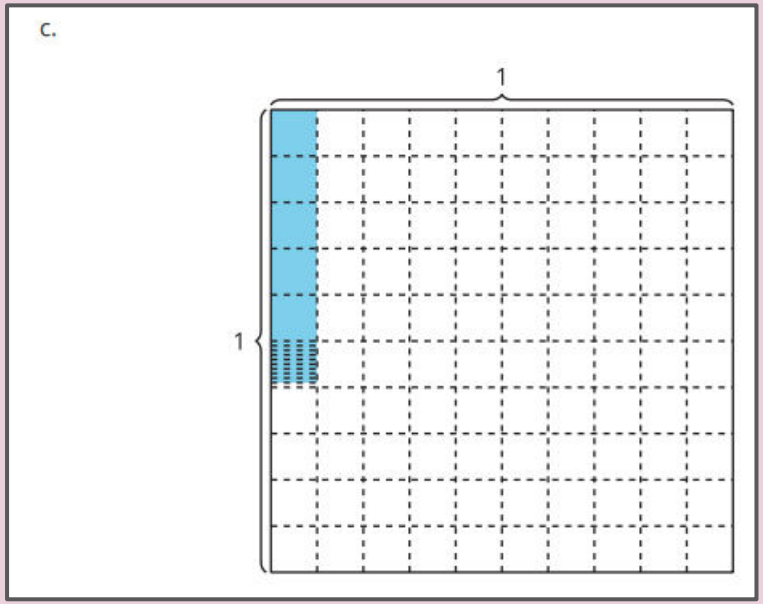


Represent Thousandths on a Grid

Activity #1

2. For each diagram, write a decimal number to represent how much is shaded. Explain or show your reasoning.

c.

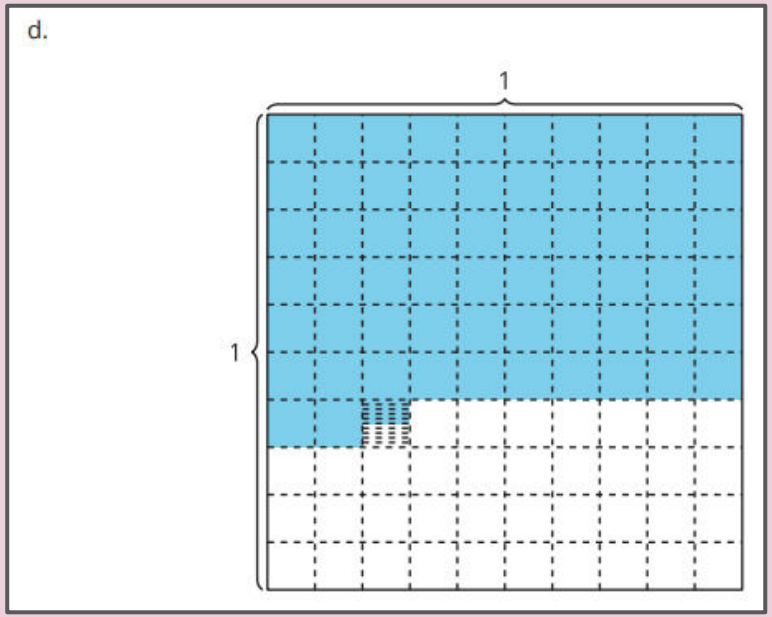


Represent Thousandths on a Grid

Activity #1

2. For each diagram, write a decimal number to represent how much is shaded. Explain or show your reasoning.

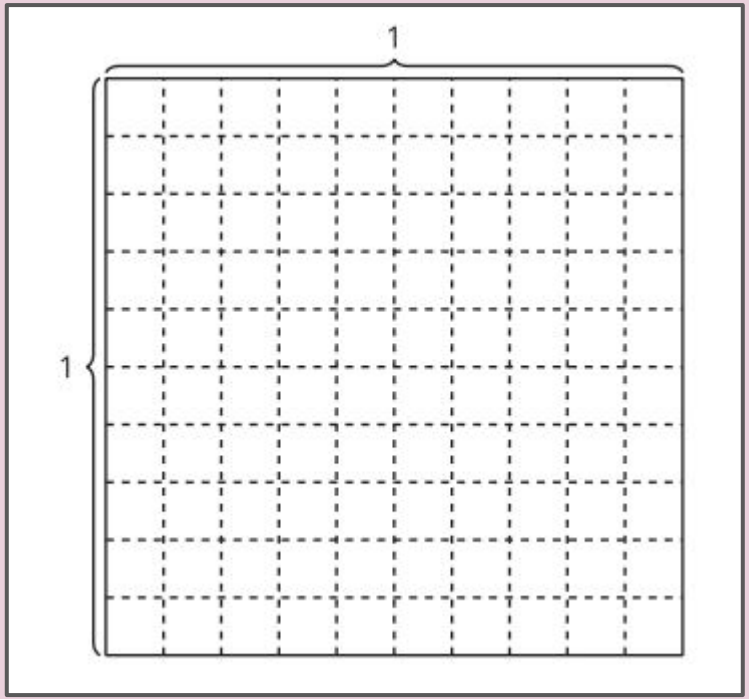
d.



Represent Thousandths on a Grid

Activity #1

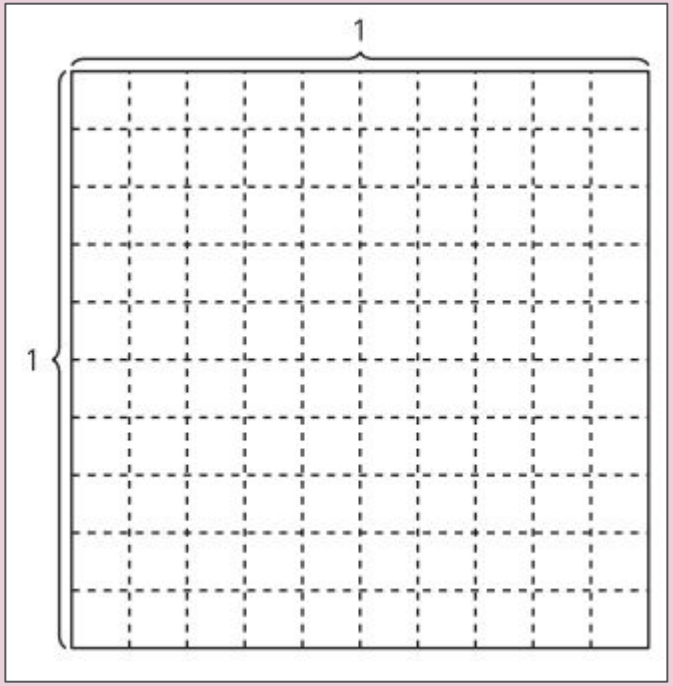
3. Shade 0.327 in the diagram. Explain your reasoning



Say What?

Activity #2

1. Shade one hundred thirty thousandths.



2. Write nine hundred ninety nine thousandths as a decimal.

3. These students view and say the number 0.15 in different ways. Who do you agree with? Why?

a. Jada says 0.15 can be said as “fifteen hundredths.”

b. Priya says it’s ”150 thousandths.”

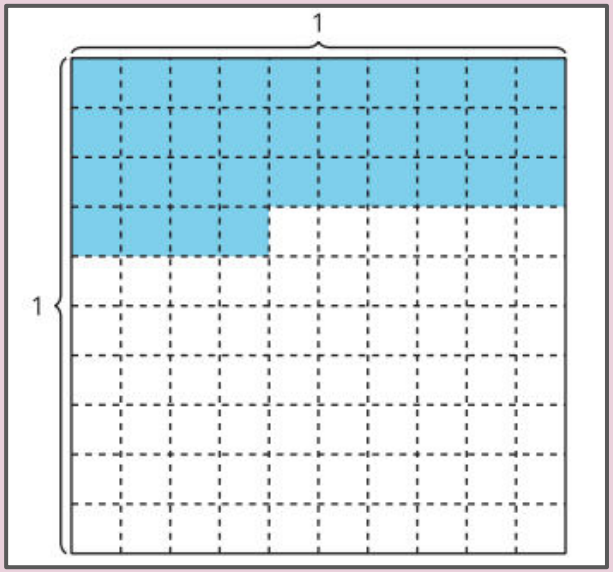
c. Tyler says it’s “15 thousandths.”

d. Diego says it's "1 tenth and 5 hundredths."

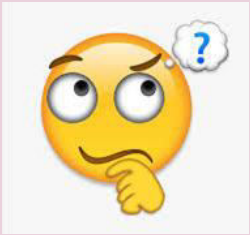
e. Mai says it's "1 tenth and half of a tenth."

Lesson Synthesis

Today we represented decimal numbers in different ways.



What are some different ways we can say this number?



3

Represent Thousandths

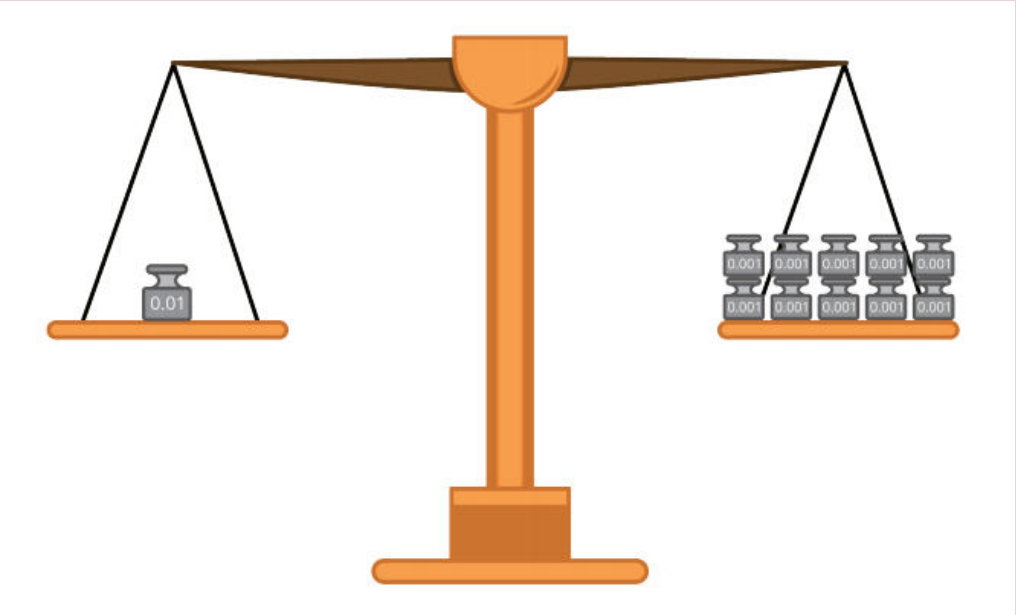
Let’s represent thousandths.

5.NBT.A.1, 5.NBT.A.3

Warm up

Notice and Wonder: Maintain Your Balance

What do you notice?



What do you wonder?

Balance the Weight

Activity #1

Imagine you have a balance and weights of 0.1 ounce, 0.01 ounce, and 0.001 ounce. Solve each problem.

1. A gold nugget weighs 0.2 ounces.

    a. What is one set of weights you could use to balance the nugget? Explain how you know.

    b. What is another set of weights you could use to balance the nugget? Explain how you know.

    c. How many 0.01 ounce weights would you need to balance the nugget? What about 0.001 ounce weights?

Balance the Weight

Activity #1

Imagine you have a balance and weights of 0.1 ounce, 0.01 ounce, and 0.001 ounce. Solve each problem.

2. Another nugget weighs 0.385 ounce.

a. What is one set of weights you could use to balance the nugget? Explain how you know.

b. What is the smallest number of weights you can use to balance the nugget? Explain how you know.

c. What is the largest number of weights you can use to balance the nugget? Explain how you know.

Balance the Weight

Activity #1

Imagine you have a balance and weights of 0.1 ounce, 0.01 ounce, and 0.001 ounce. Solve each problem.

3. Write a decimal number for the weight of the gold nuggets that balanced with:

a. 266 of the 0.001 ounce weights

b. 150 of the 0.01 ounce weights

c. 27 of the 0.1 ounce weights

Comparing Place Values with Weights

Activity #2

1. How many 0.01 ounce weights will balance one 0.1 ounce weight? Explain how you know.

2. How many 0.001 ounce weights will balance a 0.1 ounce weight? Explain how you know.

3. The table shows the weights of 3 of the gold nuggets Diego and his friends found panning for gold.

gold	weight
Nugget A	0.6 grams
Nugget B	0.06 grams
Nugget C	0.006 grams

Fill in the blanks. Explain your reasoning.

a. Nugget A weighs _____times as much as Nugget B.

b. Nugget A weighs _____times as much as Nugget C.

c. Nugget C weighs _____times as much as Nugget B.

d. Nugget C weighs _____ times as much as Nugget A.

Lesson Synthesis

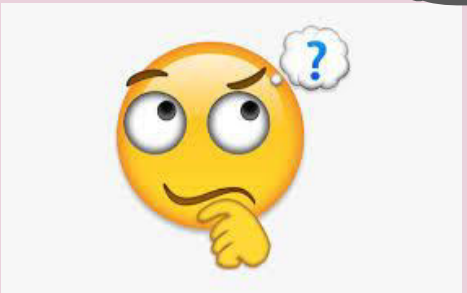
Today we investigated different ways to write decimal numbers by thinking about a balance and the different ways we can balance a given object.

Here are the weights that balance two gold nuggets.

Nugget 1	two 0.1 ounce weights
Nugget 2	twenty 0.01 ounce weights

How do you know those two weights are equivalent?

How many ounces do the two gold nuggets weigh?



How many thousandth ounce weights would you need to balance each of these nuggets?

4

Decimals in Expanded Form

Let's write decimals in lots of ways.

5.NBT.A.1, 5.NBT.A.3.a, 5.OA.A

Warm up

Which One Doesn't Belong:
Different Ways to Express a Decimal Number

A. $26 \div 100$

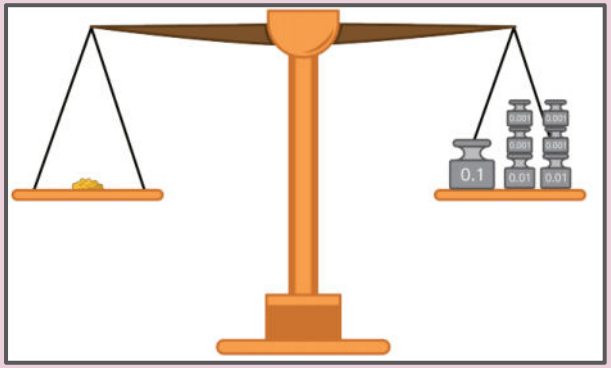
B. 0.26

C. 26×0.001

D. $(2 \times 0.1) + (6 \times 0.01)$

Weights and Place Values

Activity #1



1. Weights are used to balance some gold nuggets. Write the weight of each gold nugget in expanded form.

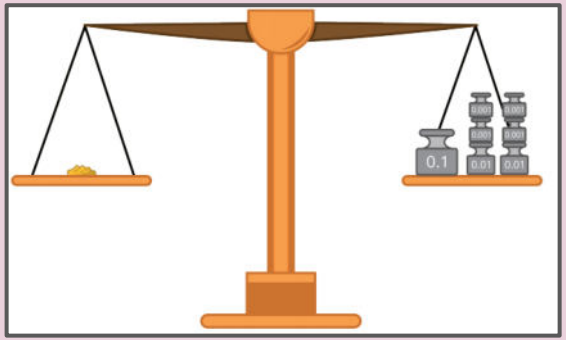
a. three 0.1 ounce weights, five 0.01 ounce weights, and eight 0.001 ounce weights

b. six 0.1 ounce weights and two 0.001 ounce weights

c. two 0.01 ounce weights and six 0.1 ounce weights

Weights and Place Values

Activity #1



2. Here are the weights of some gold nuggets in word form. Write the weights in expanded form.

   a. two hundred eighty three thousandths of an ounce

   b. four hundred nine thousandths of an ounce

3. A gold nugget weight 0.527 ounces.

   a. What is the value of each of the digits in the decimal 0.527?

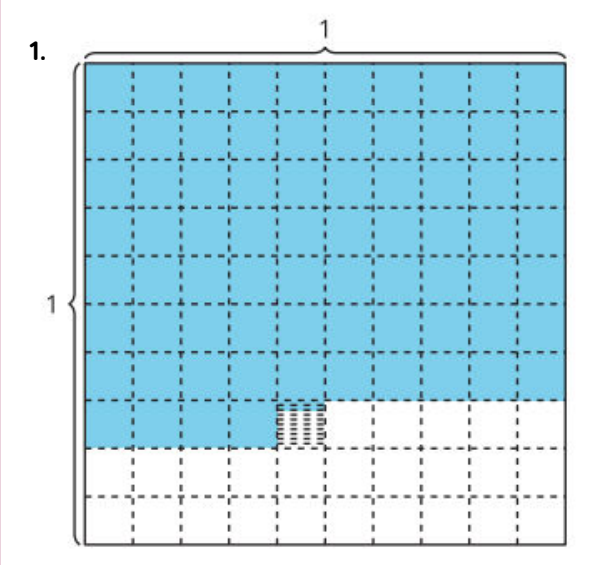
   b. How can you see this in the expanded form of 0.527?

Decimal Numbers in Numerous Ways

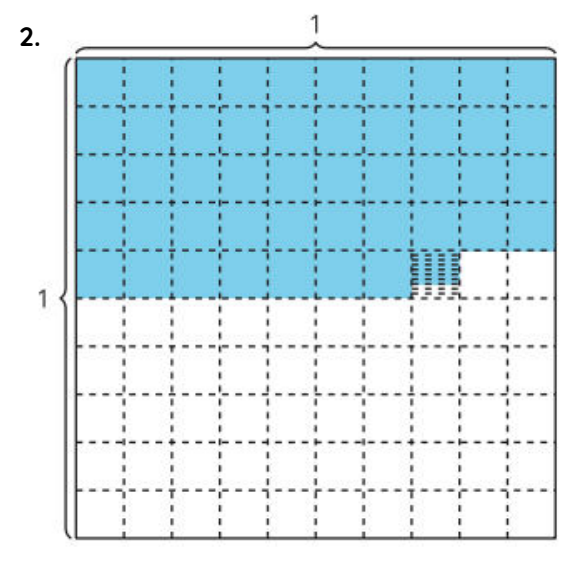
Activity #2

Find as many ways as you can to represent each number.

1.



2.

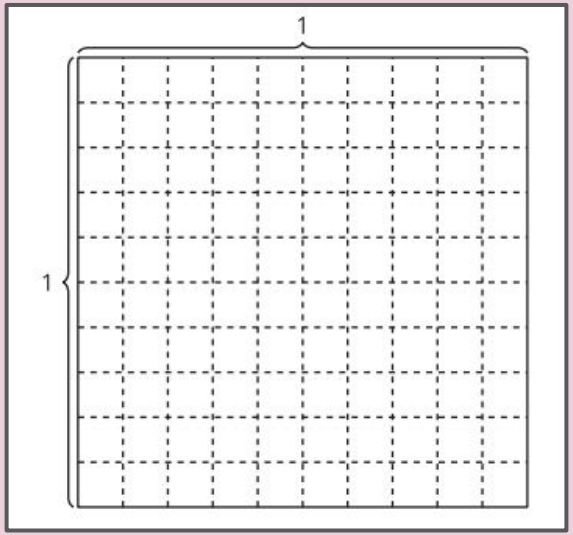


Decimal Numbers in Numerous Ways

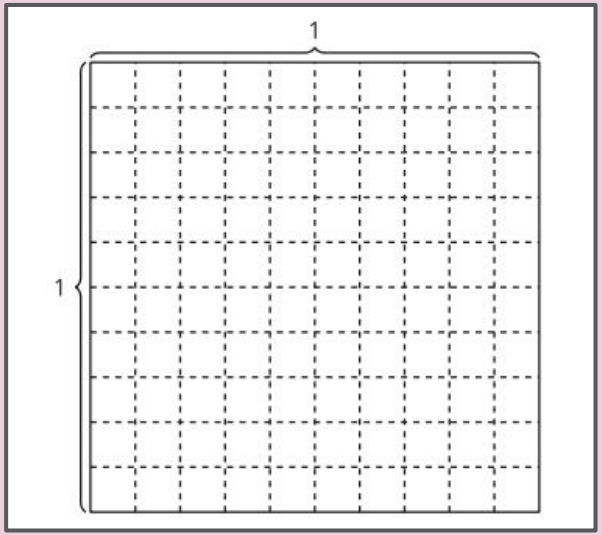
Activity #2

Find as many ways as you can to represent each number.

3. $(3 \times 0.1) + (6 \times 0.01) + (8 \times 0.001)$

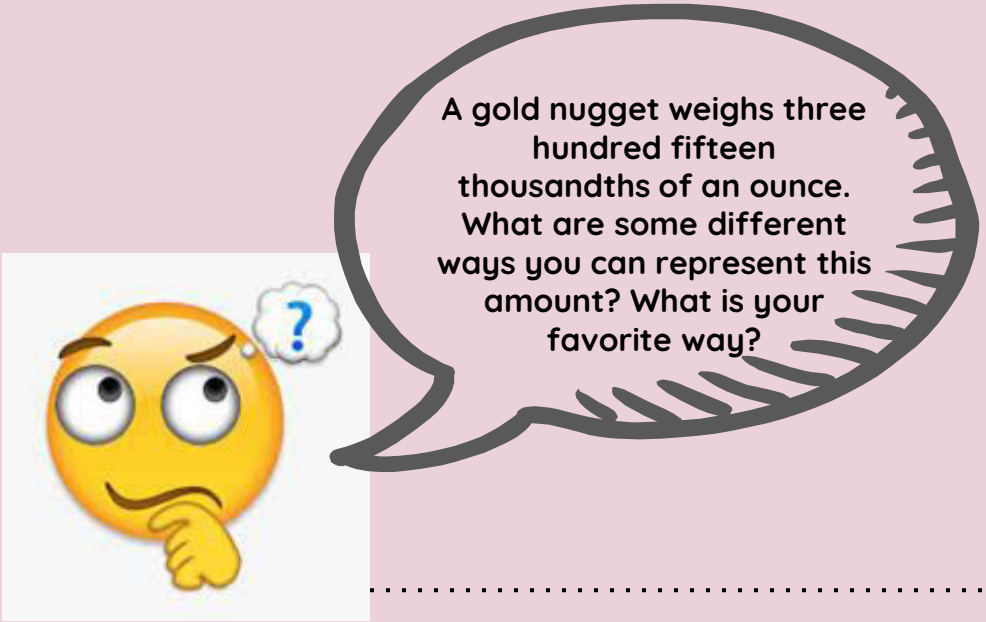


4. one hundred thirty six thousandths



Lesson Synthesis

Today we represented decimal numbers in many ways.



5

Line up the Decimals

Let's put decimals on number lines.

5.NBT.A.3, 5.NBT.A.3.b

Estimation Exploration: Number Line

Warm up

What number might be represented on the number line?

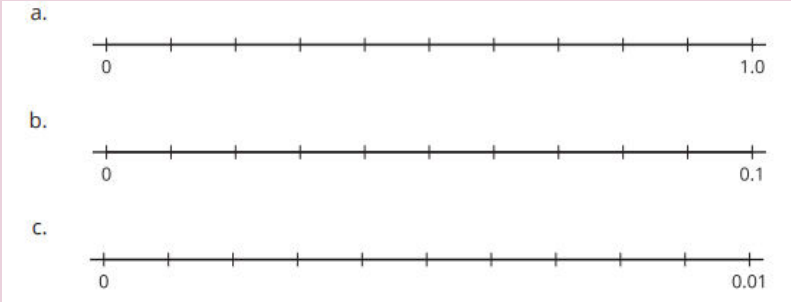
Record an estimate that is:

Too low	About right	Too high

Thousandths on the Number Line

Activity #1

1. Label the tick marks on each number line.



2. Choose one of the number lines to locate each of these points. Explain how you decided which number line to locate the number on.

a. 0.75

b. 0.182

c. 0.038

3. Estimate where 0.001 lies on the first two number lines. Explain your reasoning.

Compare Decimals

Activity #2

Answer each question. Show your reasoning on the number lines.

1. Which is greater, 0.2 or 0.15?

2. Which is greater, 0.33 or 0.38?

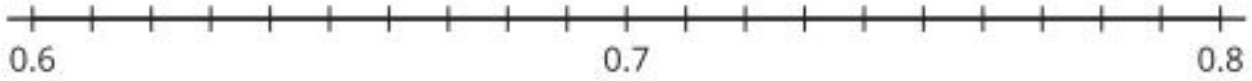
3. Which is greater, 0.527 or 0.572?

Compare Decimals

Activity #2

Answer each question. Show your reasoning on the number lines.

4. a. Which is greater, 0.685 or 0.722?



b. What is a number that is greater than 0.6 but less than 0.61? Explain how you know and plot the number on the number line.

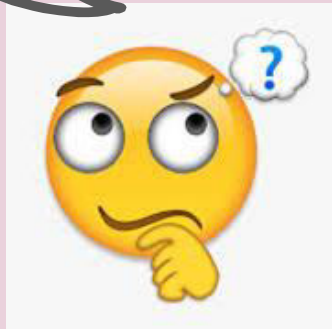
Lesson Synthesis

Today we located decimal numbers on number lines, including numbers that do not lie exactly on a tick mark.

What does the 7 in 0.572 represent? How does this help you to place 0.572 on the number line?

How does this help you to place 0.527 on the number line?

What does the 2 in 0.527 represent?



Which is greater, 0.527 or 0.572? How do you know?

6

Round Doubloons

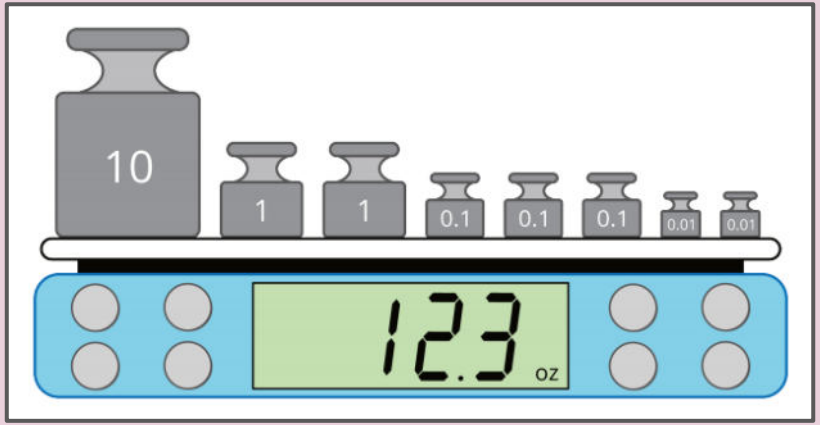
Let's round decimals.

5.NBT.A.3, 5.NBT.A.4

Warm up

Notice and Wonder: A Digital Scale

What do you notice?



What do you wonder?

Gold Doubloons

Activity #1

- Until 1728, doubloons weighed 6.867 grams.
- After 1728, they weighed 6.766 grams.

1. You have a scale that measures weight to the nearest tenth of a gram.

Was the doubloon on the scale made before or after 1728?

Gold Doubloons

Activity #1

- Until 1728, doubloons weighed 6.867 grams.
- After 1728, they weighed 6.766 grams.

2. If you had a scale that measured to the nearest gram, would you be able to tell which kind of doubloon you have from the weight?

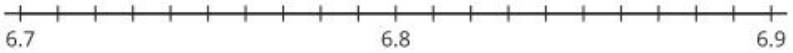
Gold Doubloons

Activity #1

- Until 1728, doubloons weighed 6.867 grams.
- After 1728, they weighed 6.766 grams.

3. a. Which doubloons weigh more, the ones made before 1728 or the ones made after 1728? Explain your reasoning.

b. Show the weights of the doubloons on the number line.



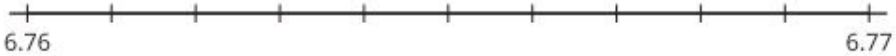
Gold Doubloons

Activity #1

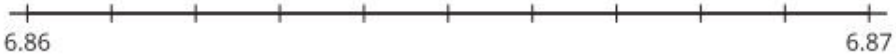
- Until 1728, doubloons weighed 6.867 grams.
- After 1728, they weighed 6.766 grams.

4. Use the number lines to find which hundredth of a gram the doubloon weights are each closest to.

a.



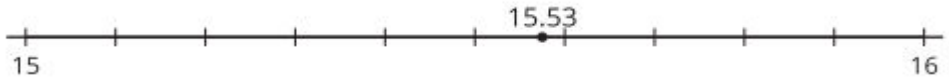
b.



Activity #2

What's the Point?

1. Jada locates 15.53 on the number line. Do you think Jada accurately located the number? Explain your reasoning.

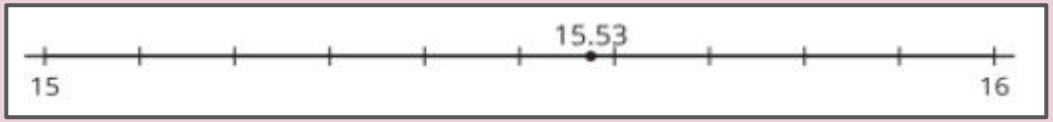


2. What could the value of the labeled points be? Explain your reasoning.

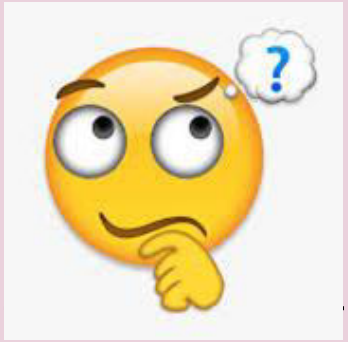
3. What are some possible values for the point P? Write some values and explain your reasoning.

Lesson Synthesis

Today we rounded numbers and estimated the value of numbers plotted on the number line.



We decided this wasn't the location of 15.53. Let's talk more about what number is marked.



- Which 2 tick marks is the number between?
- What is the number rounded to the nearest hundredth?
- What could the number be? How do you know?

7

Sizing up Decimals

Let's list decimals

5.NBT.A.3.b

Warm up

True or False: Decimal Inequalities

Decide whether each statement is true or false.

$$0.909 > 0.91$$

Warm up

True or False: Decimal Inequalities

Decide whether each statement is true or false.

$$4.1 < 4.100$$

Warm up

True or False: Decimal Inequalities

Decide whether each statement is true or false.

$$0.99 < .999$$

Caught in the Middle

Activity #1

1. Fill in the blank to make the statement true. Be prepared to explain your reasoning. Use the number lines if they are helpful.

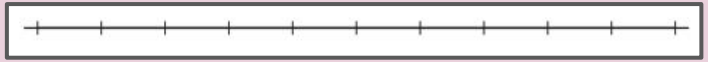
a. $786.2 < \_\_\_\_\_ < 786.3$

b. $9.99 < \_\_\_\_\_ < 10$

c. $0.46 > \_\_\_\_\_ > 0.45$

d. $0.5 < \_\_\_\_\_ < 0.51$

e. $0.99 < \_\_\_\_\_ < 0.999$



2. Kiran says that there is no number between 1.731 and 1.732.

Do you agree with Kiran? Use the number line if it is helpful.

Least to Greatest

Activity #2

1. Write each set of numbers in order from least to greatest.

a. 67.020, 67.200, 67.002

b. 1.101, 1.02, 1.1

c. 0.333, 0.323, 0.3

d. 99.99, 99.09, 99.091

Lesson Synthesis

Today we listed several decimal numbers from least to greatest.

What steps would you use to put any set of numbers in order from least to greatest?

8

Decimals on Ice

Let's round and order decimals to solve problems.

5.NBT.A.3, 5.NBT.A.4

Warm up

Notice and Wonder: The Luge

What do you notice?

What do you wonder?

48.532	82.13
48.561	82.75
48.626	82.81
48.634	83.07
48.708	82.80

How accurate is it?

Activity #1

athlete	time (seconds)	speed (mph)
Athlete 1	48.532	82.13
Athlete 2	48.561	82.75
Athlete 3	48.626	82.81
Athlete 4	48.634	83.07
Athlete 5	48.708	82.80

1. How would the results of the race change if the times were recorded to the nearest second?

2. How would the results of the race change if the times were recorded to the nearest tenth of a second?

How accurate is it?

Activity #1

athlete	time (seconds)	speed (mph)
Athlete 1	48.532	82.13
Athlete 2	48.561	82.75
Athlete 3	48.626	82.81
Athlete 4	48.634	83.07
Athlete 5	48.708	82.80

3. How would the results of the race change if the times were recorded to the nearest hundredth of a second?

4. An athlete recorded a time of 48.85 seconds to the nearest hundredth of a second. What are the possible times of this athlete recorded to the thousandth of a second?

5. An athlete recorded a time of 48.615 seconds to the nearest thousandth of a second. What are the possible times that this athlete recorded to the nearest hundredth of a second?

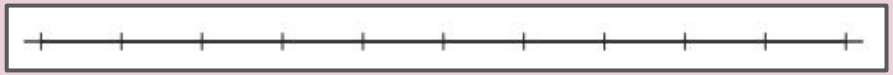
Compare Speeds

Activity #2

The table shows the top speeds, in miles per hour, of 5 luge athletes:

athlete	speed (miles per hour)
Athlete 1	82.13
Athlete 2	82.75
Athlete 3	82.81
Athlete 4	83.07
Athlete 5	82.80

1. List the top speeds of the athletes in decreasing order. You may use a number line to help you.



2. Do any of the athletes have the same top speed rounded to the nearest tenth of a mile per hour? What about rounded to the nearest mile per hour?

3. There was a sixth athlete who was faster than the rider at 82.80 mph, but slower than the rider at 82.81 mph. What could the speeds of the 3 athletes be if all measured to the nearest thousandth of a second?

Lesson Synthesis

What are some reasons to keep numbers unrounded?

When a number has been rounded can you determine the exact value?

What are some reasons to round numbers?

If a luge rider finished a race in 51 seconds to the nearest second, what does that tell you about the speed to the tenth of a second?

Section Summary

In this section, we represented decimals to the thousandths place. We recognized relationships between tenths, hundredths, and thousandths:

- 10 thousandths is equal to 1 hundredth.
- 100 thousandths is equal to 1 tenth.
- 1,000 thousandths is equal to 1.

We located decimals to the thousandths place on number lines. We compared and rounded numbers to the thousandths place.

What do you know about the number 0.879?

Adaptation
Lesson 7

Add and Subtract Within 100,000

Let's find sums and differences of large numbers.

Compose and Decompose to Add and Subtract

Let's compose and decompose groups of ten to add and subtract.

4.NBT.B.4

Warm up

: Estimation Exploration: What's the Difference?

Estimate the difference:

$$42,050 - 3,790$$

Record your estimate that is:

Too low	About right	Too high

Steps During the Weekend

Activity #1

The teacher also keeps track of the number of steps she took during the weekend. The data from Saturday and Sunday of that same week are shown.

Saturday

Steps
17,375 steps

Sunday

Steps
14,024 steps

Here are two methods to compute the total number of steps she took over the weekend.

Method A

$$
\begin{array}{rcccccccccl}
 & 10{,}000 & + & 7{,}000 & + & 300 & + & 70 & + & 5 & \\
- & 10{,}000 & + & 4{,}000 & + & 0 & + & 20 & + & 4 & \\
\hline
 & 20{,}000 & + & 11{,}000 & + & 300 & + & 90 & + & 9 & = 31{,}399
\end{array}
$$

Method B

$$
\begin{array}{rcccccc}
 & 1 & & & & & \\
 & 1 & 7 & , & 3 & 7 & 5 \\
+ & 1 & 4 & , & 0 & 2 & 4 \\
\hline
 & 3 & 1 & , & 3 & 9 & 9
\end{array}
$$

1. Analyze the methods. Discuss with your partner:

- What is happening in each method?
- How are they alike? How are they different?

Steps During the Weekend

Activity #1

The teacher also keeps track of the number of steps she took during the weekend. The data from Saturday and Sunday of that same week are shown.

Here are two methods to compute the total number of steps she took over the weekend.

Method A

$$\begin{array}{rrrrrrrrrr} & 10{,}000 & + & 7{,}000 & + & 300 & + & 70 & + & 5 \\ - & 10{,}000 & + & 4{,}000 & + & 0 & + & 20 & + & 4 \\ \hline & 20{,}000 & + & 11{,}000 & + & 300 & + & 90 & + & 9 \end{array} = 31{,}399$$

Method B

$$\begin{array}{r} {\scriptstyle 1} \\ 17{,}375 \\ + \quad 14{,}024 \\ \hline 31{,}399 \end{array}$$

2. Use both methods to find the difference between the number of steps the teacher took on Saturday and on Sunday.

Steps During the Weekend

Activity #1

The teacher also keeps track of the number of steps she took during the weekend. The data from Saturday and Sunday of that same week are shown.

Here are two methods to compute the total number of steps she took over the weekend.

Method A

$$\begin{array}{r} 10{,}000 + 7{,}000 + 300 + 70 + 5 \\ - \quad 10{,}000 + 4{,}000 + 0 + 20 + 4 \\ \hline 20{,}000 + 11{,}000 + 300 + 90 + 9 = 31{,}399 \end{array}$$

Method B

$$\begin{array}{r} {\scriptstyle 1} \qquad \\ 17{,}375 \\ +\ 14{,}024 \\ \hline 31{,}399 \end{array}$$

3. During another week, the teacher took 26,815 steps during the weekdays and 11,403 steps during the weekend. Use both methods to find the total number of steps she took that week.

Priya's Family Heirloom

Activity #2

Priya's mom wore an heirloom bracelet at her wedding in 1996. The bracelet was made in 1947. Priya subtracted to find out how old the bracelet was when her parents were married.

```
          8 16
  1 , 9  9  6     (9 and 6 crossed out)
- 1 , 9  4  7
-------------
         4  9
```

Priya learned that her grandmother had also worn the bracelet at her wedding 24 years earlier. Priya subtracted to find out when her grandparents were married.

```
  1 , 9 9 6
-       2 4
-----------
  1 , 9 7 2
```

1. Are both calculations correct? Why does one calculation have some numbers crossed out and some new numbers, but the other one does not? Explain your reasoning.

2. Priya's grandmother wore an heirloom necklace and earring set that was 63 years old when she was married in 1972.

a. If Priya uses the standard algorithm to subtract 1972 - 63 will she need to decompose a unit? Explain your reasoning.

b. Use the standard algorithm to subtract 1972 - 63 and find the year the necklace was made.

Priya's Family Heirloom

Activity #2

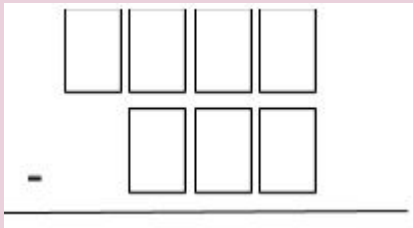
Priya's mom wore an heirloom bracelet at her wedding in 1996. The bracelet was made in 1947. Priya subtracted to find out how old the bracelet was when her parents were married.

$$\begin{array}{r} {\scriptstyle 8\ 16} \\ 1\ 9\ \cancel{9}\ \cancel{6} \\ -\ 1\ 9\ 4\ 7 \\ \hline 4\ 9 \end{array}$$

Priya learned that her grandmother had also worn the bracelet at her wedding 24 years earlier. Priya subtracted to find out when her grandparents were married.

$$\begin{array}{r} 1\ 9\ 9\ 6 \\ -\ \ \ \ 2\ 4 \\ \hline 1\ 9\ 7\ 2 \end{array}$$

3. Create a subtraction problem that would not require decomposing a unit to subtract. Then solve the problem.



Adaptation
Lesson 8

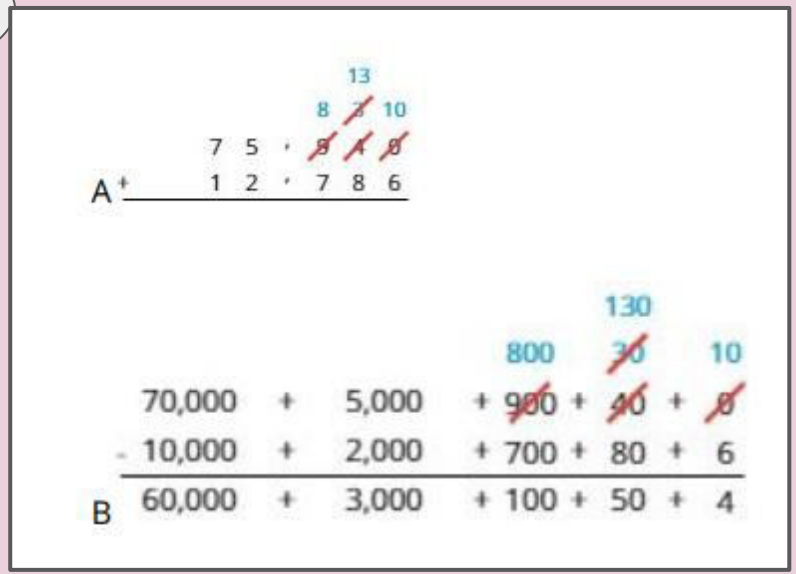
Add and Subtract Within 1,000,000

Let's compose or decompose more than one unit to add and subtract large numbers.

Warm up

Notice and Wonder: Subtracting Tens of Thousands

What do you notice?



What do you wonder?

Add and Subtract Large Numbers

Activity #1

1. Use the standard algorithm to find the value of each sum and each difference. If you get stuck, try writing the numbers in expanded form.

    a. 7,106 + 2,835
    b. 8,179 – 3,599
    c. 142,571 + 10,909
    d. 268,322 – 72,145

Add and Subtract Large Numbers

Activity #1

2. Find the missing number that would make each computation true.

a.
$$\begin{array}{r} 67,182 \\ + \\ \hline 129,400 \end{array}$$

b.
$$\begin{array}{r} 234,650 \\ - \\ \hline 193,710 \end{array}$$

Spot Errors

Activity #2

1. Kiran is trying to find the sum of 204,500 and 695. He isn't sure how to set up the calculation, so he wrote down two ideas. Which way is correct? Explain why the other one is incorrect.

A.

$$\begin{array}{r} 20{,}450 \\ +\quad 69.5 \\ \hline 89.950 \end{array}$$

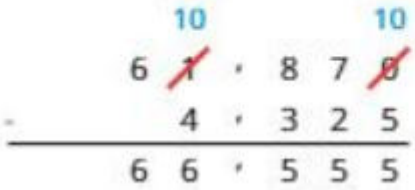
B.

$$\begin{array}{r} {\scriptstyle 1} \\ 204{,}500 \\ +\quad 695 \\ \hline 205{,}195 \end{array}$$

Spot Errors

Activity #2

2. Lin made some errors when subtracting 4,325 from 61,870. Identify as many errors as you can find. Then, show the correct way to subtract.



9

Make Sense of Decimal Addition

Let’s add decimals.

5.NBT.B.7

Warm up

Estimation Exploration: What is Hidden?

What might be the value of the sum?

$2.26 + 1.$ 

Record an estimate that is:

Too low	About right	Too high

The Sum

Activity #1

1. Find the value of the sum.

Show your thinking. Organize it so it can be followed by others.

$$2.26 + 1.87$$

2. What questions do you have about adding decimals?

Don’t Go Over 1

Activity #2

1. Play a round of the game called Don’t Go Over 1.

Directions: Roll one number cube. Decide whether you want to use the number to represent tenths or hundredths. Record the number of tenths or hundredths you rolled. Add the number of tenths or hundredths to your previous score. After 6 rolls, the winner is the person whose total sum is closest to 1, without being greater than 1.

	number rolled	0.1	0.01	equation to represent the total
1				
2				
3				
4				
5				
6				

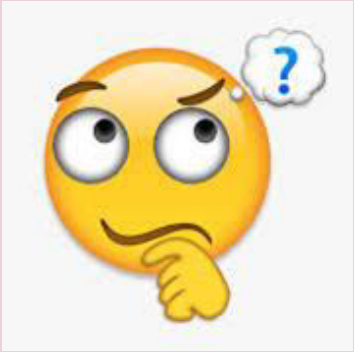
2. Describe a move that you could have made differently to change the outcome of the game.

Lesson Synthesis

How is it different?

What do you still wonder about adding decimals?

How is adding decimals the same as adding whole numbers?



10

Add Decimals

Let’s reason about sums of decimals.

5.NBT.B.7

Number Talk: 99 Hundredths

Warm up

Find the value of each expression mentally.

$$1.00 + 0.99 + 0.02$$

Number Talk: 99 Hundredths

Warm up

Find the value of each expression mentally.

$$1.99 + 0.02$$

Number Talk: 99 Hundredths

Warm up

Find the value of each expression mentally.

$$1.99 + 0.03$$

Number Talk: 99 Hundredths

Warm up

Find the value of each expression mentally.

$$1.99 + 0.13$$

Activity #1

Estimate and Solve

1. Circle the number that the sum is closest to. Explain your reasoning.

$2.82 + 5.2$		
7	8	9

2. What is the value of 2.82 + 5.2? Explain or show your reasoning

3. Circle that number that the sum is closest to. Explain your reasoning.

$5.8 + 2.97$		
7	8	9

4. What is the value of 5.8 + 2.97 ? Explain or show your reasoning.

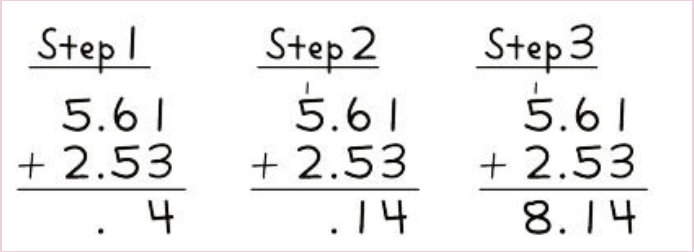
Introduce the Algorithm

Activity #2

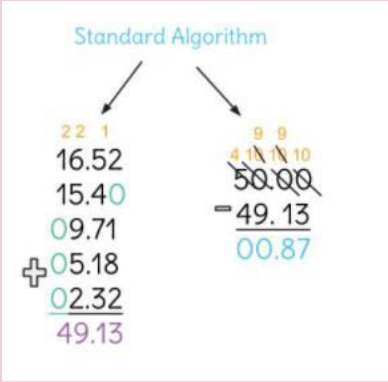
1. Find the value of 5.61 + 2.53.

Show your reasoning.

2. Han used the standard algorithm to add decimals. This is Han's work. Describe what Han did in each step.



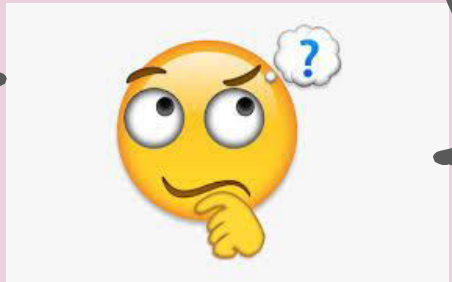
3. Use the standard algorithm to find the value of 6.62 + 3.74.



Lesson Synthesis

Today we added decimals and we used the standard algorithm.

Did we answer any of the questions that we wondered about?



How is the standard algorithm for adding decimals the same as and different from the standard algorithm for adding whole numbers?

Analyze Addition Mistakes

Let’s use place value strategies to add decimals.

Warm up

Estimation Exploration: Many Places

$$1,987.89 + 658.54$$

Record an estimate that is:

Too low	About right	Too high

Compare Calculations

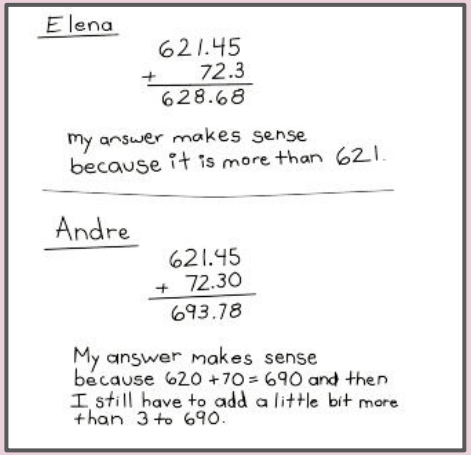
Activity #1

1. Find the value of 621.45 + 72.3 .

Explain or show your reasoning.

2. Elena and Andre found the value of 621.45 + 72.3 .

Who do you agree with? Explain or show your reasoning.



Elena

$$\begin{array}{r} 621.45 \\ +\ \ 72.3 \\ \hline 628.68 \end{array}$$

my answer makes sense because it is more than 621.

Andre

$$\begin{array}{r} 621.45 \\ +\ 72.30 \\ \hline 693.78 \end{array}$$

My answer makes sense because 620 + 70 = 690 and then I still have to add a little bit more than 3 to 690.

Same Digits, Different Sums

Activity #2

1. Find the value of each expression.
Show or explain your reasoning.

a. $2.63 + 7.74$

b. $26.3 + 774$

c. $46.3 + 31.42$

d. $463 + 3.14$

2. How are 46.3 + 31.42 and 463 + 3.14 the same?

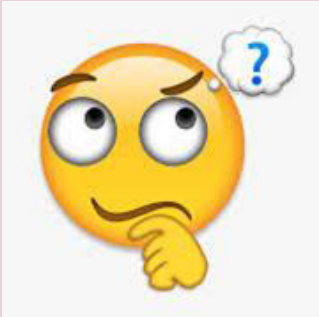
How are they different?

Lesson Synthesis

Today we analyzed errors in methods for adding decimals.

$$7.23 + 4.08$$

Turn and Talk: Describe what is the most important thing to remember when we add decimal numbers.



How can you tell if the sum is going to be closer to 11, 12, or 13?

What are some mistakes someone can make when finding the sum?

12

Subtraction Strategies

Let’s subtract decimals.

5.NBT.B.7

Warm up

Estimation Exploration: Hidden Digit Subtraction

Estimate the difference.

2.26 – 1. 

Record an estimate that is:

Too low	About right	Too high

The Difference

Activity #1

1. Find the value of 2.26 - 1.32 . Explain or show your reasoning.

2. What questions do you have about subtracting decimals?

Activity #2

Don't Go Under 1

1. Play a round of the game called Don't Go Under 1.

Directions: Roll one number cube. Decide whether you want to use the number to represent tenths or hundredths. Record the number of tenths or hundredths you rolled. Subtract the number of tenths or hundredths from the number 2 or your previous score. After 6 rolls, the winner is the person whose total difference is closest to 1, without being less than 1.

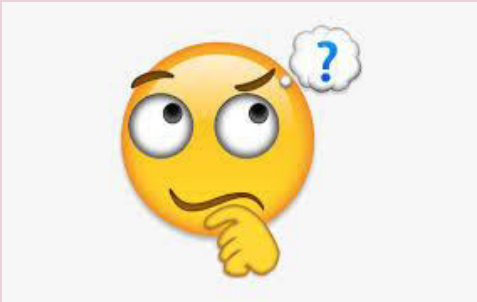
2. Describe a move that you could have done differently to change the outcome of the game.

	number rolled	0.1	0.01	equation to represent the difference
1				2 – _____ = _____
2				
3				
4				
5				
6				

Lesson Synthesis

How is it different?

How is subtracting decimals the same as subtracting whole numbers?



What do you still wonder about subtracting decimals?

13

Strategies to Subtract Decimals

Let’s use place value to subtract decimals.

5.NBT.B.7

Number Talk: One and Five Tenths

Warm up

Find the value of each expression mentally.

$$1.50 - 0.51$$

Number Talk: One and Five Tenths

Warm up

Find the value of each expression mentally.

$$1.50 - 0.52$$

Number Talk: One and Five Tenths

Warm up

Find the value of each expression mentally.

$$1.50 - 0.60$$

Number Talk: One and Five Tenths

Warm up

Find the value of each expression mentally.

$$1.50 - 0.62$$

Estimate and Subtract

Activity #1

1. Circle the number that the difference is closest to. Explain your reasoning.

$5.20 - 2.82$

1 2 3

2. What is the value of 5.20 - 2.82? Explain or show your reasoning.

3. Circle the number that the difference is closest to. Explain your reasoning.

$5.8 - 2.97$

1 2 3

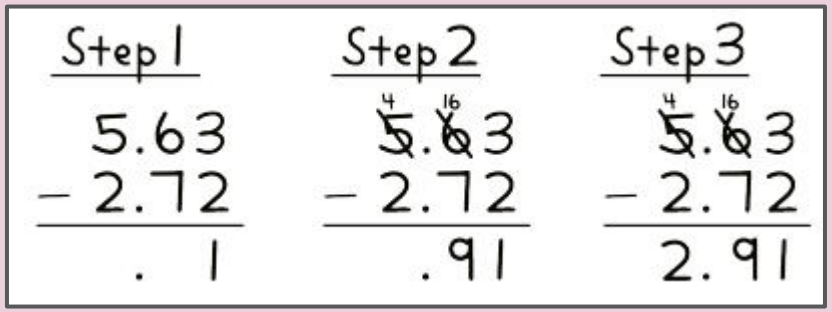
4. What is the value of 5.8 - 2.97 ? Explain or show your reasoning.

Revisit the Algorithm

Activity #2

1. Find the value of 5.63 - 2.72 . Show your thinking.

2. Han used the standard algorithm to subtract decimals. This is Han's work. Describe what Han did in each step.



3. Use the standard algorithm to find the value of 6.62 - 3.71.

Lesson Synthesis

Today we subtracted decimals and we used the standard algorithm.

How is the standard algorithm for subtracting decimals the same as and different from the standard algorithm for subtracting whole numbers?

Did we answer any of the questions that we wondered about

Analyze Subtraction Mistakes

Let’s use place value strategies to subtract decimals.

Warm up

Estimation Exploration: Many Places Make a Difference

Estimate the difference.

$$1{,}957.54 - 678.89$$

Record an estimate that is:

Too low	About right	Too high

Compare Calculations To Evaluate a Difference

Activity #1

1. Find the value of 622.35 - 71.4. Explain or show your reasoning.

2. Elena and Andre found the value of 622.35 - 71.4 .
   Who do you agree with? Explain or show your reasoning.

Elena

$$\begin{array}{r} 622.35 \\ -\ \ 71.4 \\ \hline 615.21 \end{array}$$

my answer makes sense because 615.21 is less than 622.35.

Andre

$$\begin{array}{r} 622.35 \\ -\ 71.40 \\ \hline 550.95 \end{array}$$

My answer makes sense because 620 - 70 = 550. So my answer should be right around 550.

Activity #2

Same Digits, Different Difference

1. Find the value of each expression. Explain or show your reasoning.

a. 7.74 – 2.63

b. 774 – 26.3

c. 46.5 – 31.42

d. 463 – 3.14

2. How are 46.5 - 31.42 and 463 - 3.14 the same? How are they different?

Lesson Synthesis

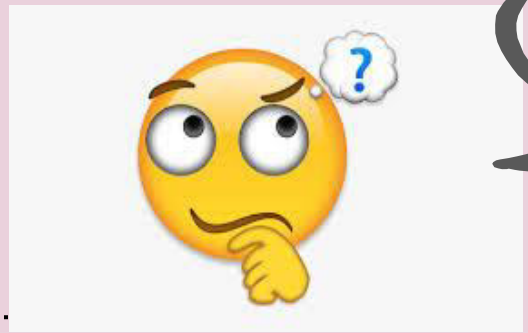
Today we analyzed errors in methods for subtracting decimals.

$$7.13 - 4.88$$

Turn and Talk: Describe what is the most important thing to remember when we subtract decimal numbers.

How can you tell if the difference is going to be closer to 1, 2, or 3?

What are some mistakes someone can make when finding the difference?



Section Summary

In this section, we learned that we can use the same strategies and algorithms we used to add and subtract whole numbers to add and subtract decimals.

We learned that it is helpful to estimate a sum before we solve. For example, the sum below is going to be around 621 + 72 or 693.

$$\begin{array}{r} 6\,2\,1.\,4\,5 \\ +\quad 7\,2.\,3\,0 \\ \hline 6\,9\,3.\,7\,5 \end{array}$$

We also learned that it is important to make sure the places are aligned when we add and subtract.

$$\begin{array}{r} 5\ 12\ 1\ 13 \\ \cancel{6}\ \cancel{2}\ \cancel{2}.\ \cancel{3}\ 5 \\ -\quad 7\,1.\,4\,0 \\ \hline 5\,5\,0.\,9\,5 \end{array}$$

15

Multiply Decimals by Whole Numbers

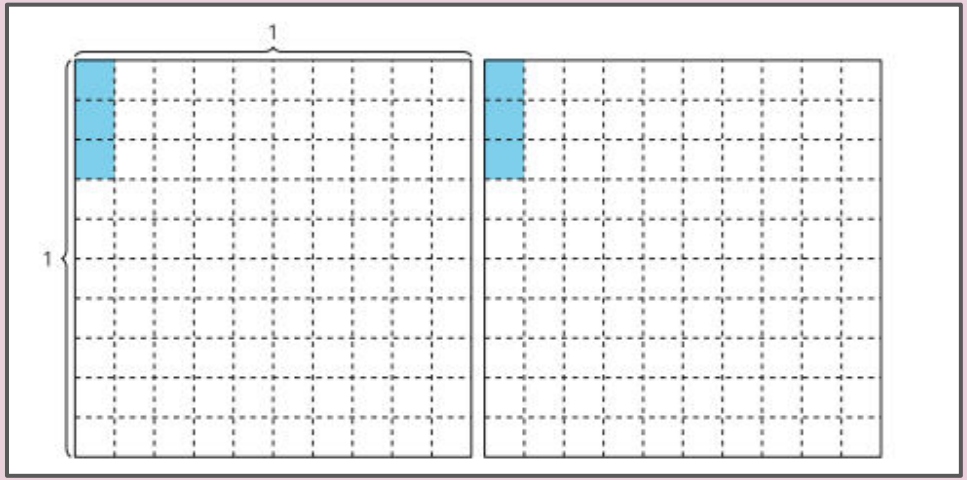
Let’s multiply whole numbers by tenths and hundredths.

5.NBT.B.7, 5.OA.A.2

Warm up

How Many Do You See: Grids

How many do you see?

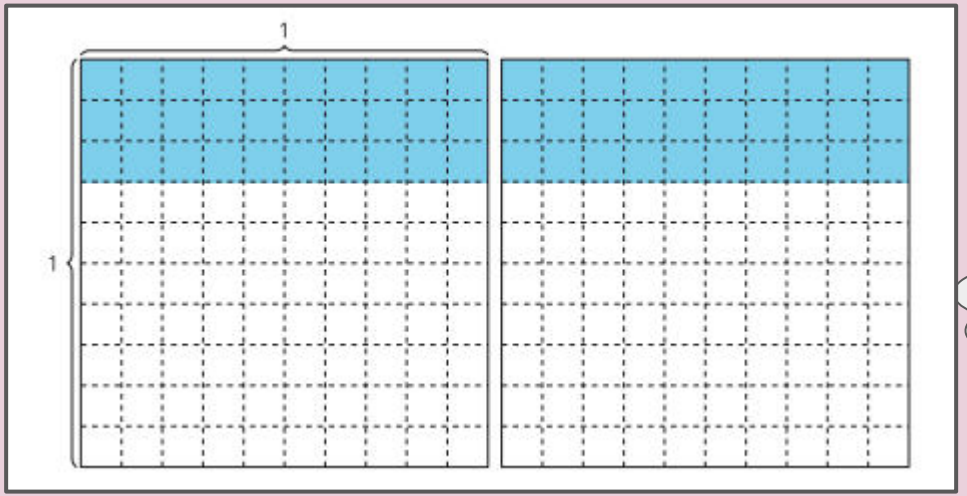


How do you see them?

Warm up

How Many Do You See: Grids

How many do you see?

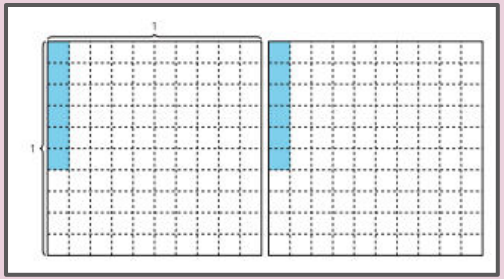


How do you see them?

Where Do You See It?

Activity #1

1. a. Write as many multiplication expressions as you can to represent the shaded region.

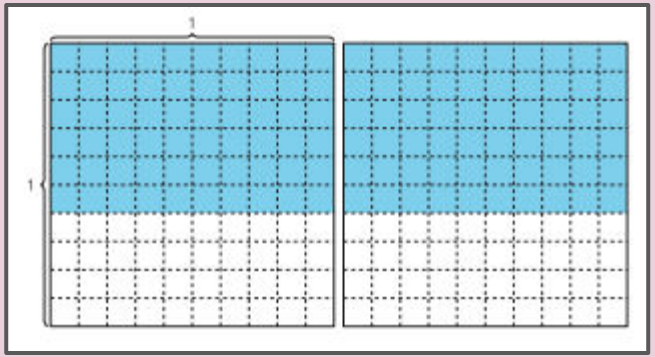


b. What is the value of 2 x 0.06 ? Show or explain your thinking.

Where Do You See It?

Activity #1

2. a. Write as many multiplication expressions as you can to represent the shaded region.



b. What is the value of 2 x 0.6 ?

Activity #2

Products of Tenths, Products of Hundredths

1. Find the value of each expression.
Show or explain your thinking. Use the grids if they are helpful.

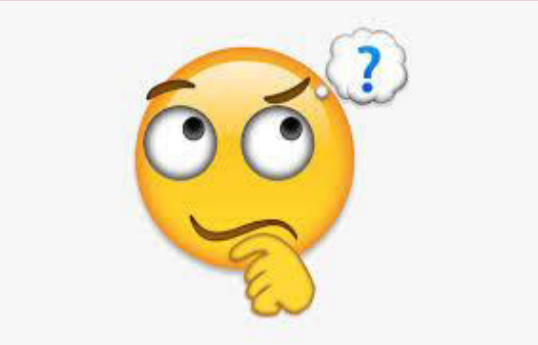
4×0.1	4×0.01
4×0.2	4×0.02
4×0.3	4×0.03
4×0.4	4×0.04

2. What patterns do you notice?

3. Pick one of your patterns and check to see if the pattern continues. Can you explain why the pattern is true?

Lesson Synthesis

Today we found products of a whole number and some tenths and a whole number and some hundredths. What questions do you have about multiplying whole numbers and decimals?



16

Use Whole Number Facts

Let’s multiply whole numbers and decimals.

5.NBT.B.7, 5.OA.A.1

Warm up

True or False: Group Dynamics

Decide if each statement is true or false.

$$30 \times 2 \times 10 = 6 \times 10$$

Be prepared to explain your reasoning.

Warm up

True or False: Group Dynamics

Decide if each statement is true or false.

$$30 \times 2 \times 10 = 20 \times 3 \times 10$$

Be prepared to explain your reasoning.

Warm up

True or False: Group Dynamics

Decide if each statement is true or false.

$$60 \times 10 = 30 \times 20$$

Be prepared to explain your reasoning.

Use Whole Number Facts

Activity #1

1. Find the value of each expression.

a. 3×0.5

b. 5×0.3

c. 7×0.02

2. Kiran wrote this explanation to describe the strategy he used to multiply a whole number by some tenths: "I just turn the numbers into whole numbers, multiply them, and call them tenths." (Pause for teacher directions.)

3. Can you adapt Kiran's reasoning to find 6 x 0.07? Explain your reasoning.

Activity #2

Agree or Disagree

1. For each equation, decide whether you agree or disagree and show or explain why.

a. $4 \times 0.7 = 28$

b. $5 \times 0.8 = 0.40$

c. $6 \times 0.03 = (6 \times 3) \times 0.01$

d. $8 \times 0.07 = (8 \times 7) \times 0.1$

2. Fill in the blank to make each equation true.

a. $3 \times 0.7 = 3 \times 7 \times$ _____

b. $3 \times 0.07 = 3 \times 7 \times$ _____

c. $5 \times$ _____ $= (5 \times 4) \times 0.1$

Lesson Synthesis

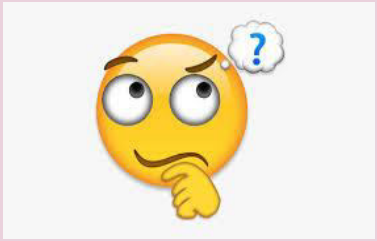
Today we used our understanding of place value to multiply decimals.

25×0.3

25×0.03

Describe the process you would use to find the value of these expressions?

How can we multiply any whole number by an amount of tenths or hundredths?



17

Decimal Multiplication Expressions

Let’s interpret and evaluate multiplication expressions with decimals and whole numbers.

5.NBT.B.7, 5.OA.A

Number Talk: Many Hundredths

Warm up

Find the value of each expression mentally.

$$30 \times 2 \times 0.1$$

Number Talk: Many Hundredths

Warm up

Find the value of each expression mentally.

$$20 \times 0.1 \times 3$$

Number Talk: Many Hundredths

Warm up

Find the value of each expression mentally.

$$0.1 \times 60$$

Number Talk: Many Hundredths

Warm up

Find the value of each expression mentally.

$$0.1 \times 2 \times 3$$

Card Sort: Decimal Multiplication Card Sort

Activity #1

1. Your teacher will give you a set of cards that show multiplication expressions.
    a. Sort the cards into 2 categories of your choosing. Then, sort the cards into 2 categories in a different way. Be prepared to explain the meaning of your new categories. (Pause for teacher directions.)
    b. Match each expression to an equal expression marked with an A, B, or C. Be ready to explain your reasoning.

2. Choose one of the matching expressions to find the value of the expressions on cards A, B, and C.

3. Write at least one more expression that is equal to each of the expressions on cards A, B, and C.

A. 4×3.5

B. 4×0.35

C. 4×3.9

$(4 \times 3) + (4 \times 0.5)$

$(35 \times 4) \div 100$

$2 \times 2 \times 3.5$

$4 \times 35 \times 0.1$

$(4 \times 0.3) + (4 \times 0.05)$

$35 \times 4 \times 0.01$

$(4 \times 4) - (4 \times 0.1)$

$(4 \times 3) + (4 \times 0.9)$

$(4 \times 4) - (4 \times 0.5)$

$4 \times 39 \times 0.1$

Activity #2

Choose a Strategy

1. Find the value of each expression. Show or explain your reasoning for each problem.

a. 6×0.12

b. 4×1.4

c. 5×3.9

Activity #3

More Multiplication Problems (Optional)

1. Find the value of each expression.

a. 35×0.08

b. 35×0.7

c. 35×0.78

d. 42×0.66

Lesson Synthesis

Today we used different strategies to multiply whole numbers by decimals. How can we describe the different strategies we used?

How is multiplying decimals the same as multiplying whole numbers? How is it different?

What do you still wonder about multiplying decimals?

Revisit Area Diagram

Let’s multiply tenths by tenths.

Warm up

Number Talk: Multiplication with Tenths

Find the value of each expression mentally.

$$\frac{1}{10} \times \frac{1}{10}$$

Warm up

Number Talk: Multiplication with Tenths

Find the value of each expression mentally.

$$\frac{6}{10} \times \frac{1}{10}$$

Warm up

Number Talk: Multiplication with Tenths

Find the value of each expression mentally.

$$\frac{6}{10} \times \frac{8}{10}$$

Warm up

Number Talk: Multiplication with Tenths

Find the value of each expression mentally.

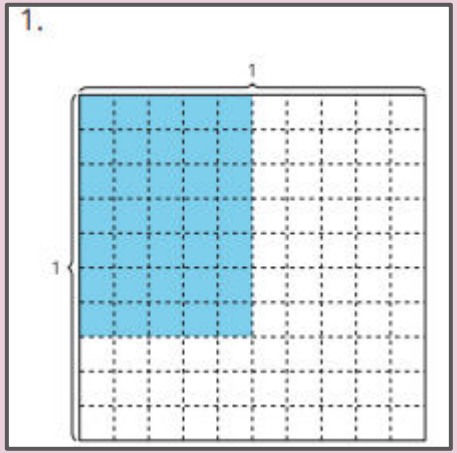
$$\frac{16}{10} \times \frac{8}{10}$$

Represent Decimal Products with Area Diagrams

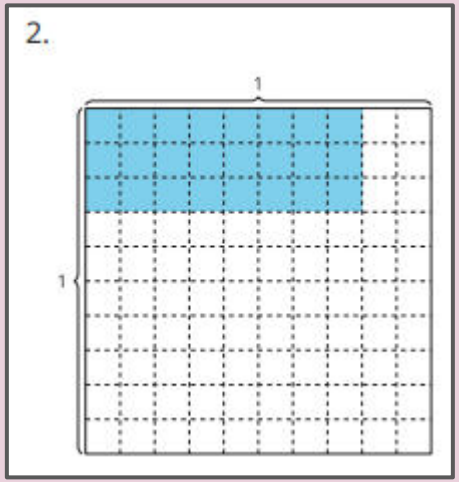
Activity #1

Find the area of each shaded region. Show or explain your reasoning.

1.



2.

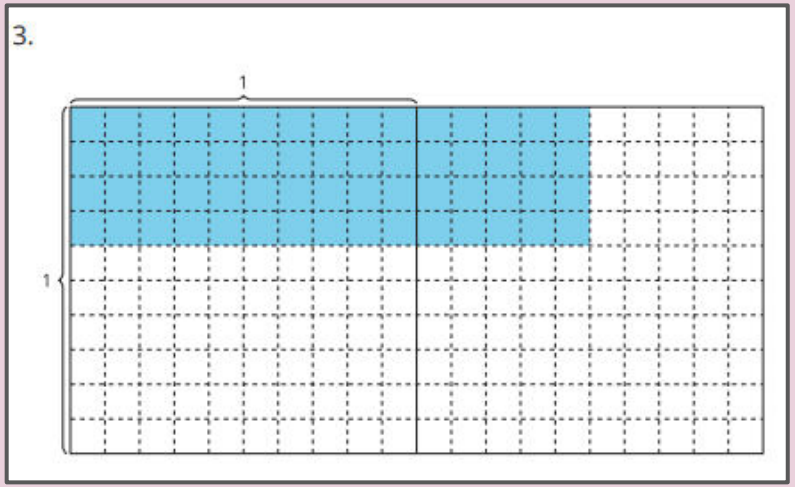


Represent Decimal Products with Area Diagrams

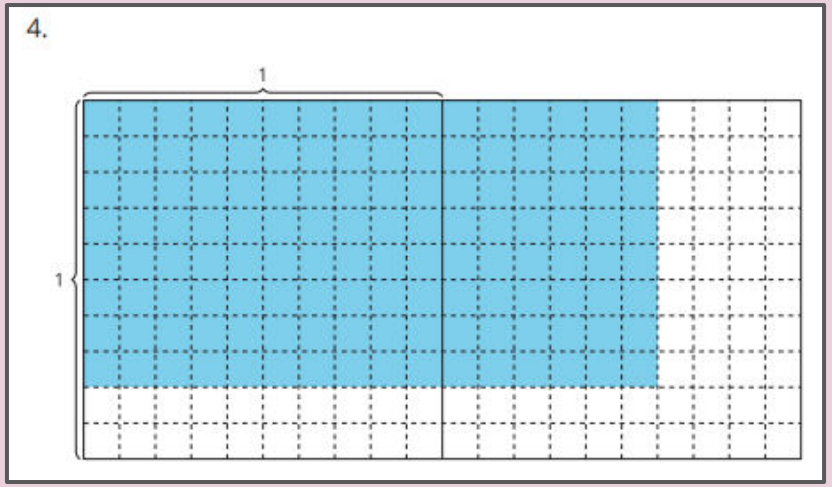
Activity #1

Find the area of each shaded region. Show or explain your reasoning.

3.



4.

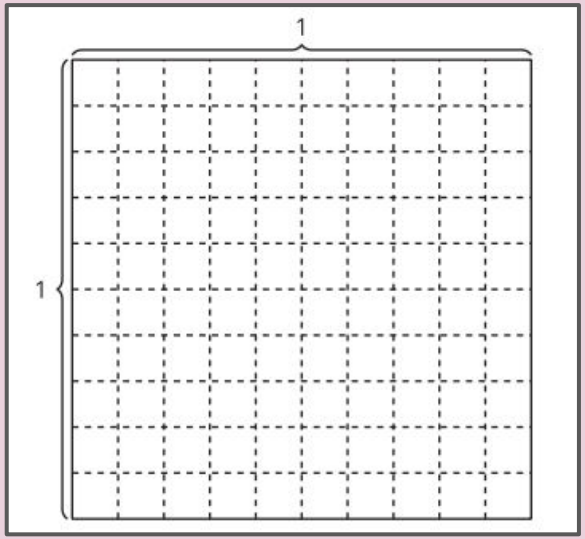


Activity #2

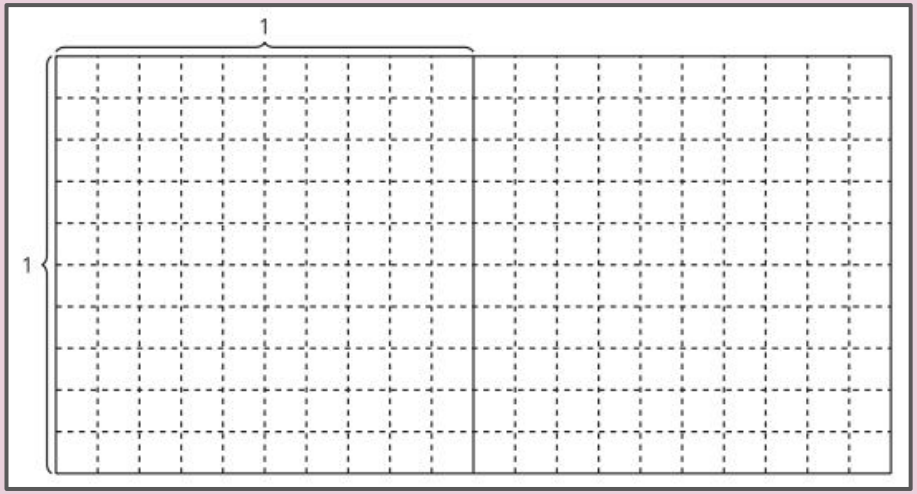
Multiply Tenths

1. Shade the diagram to represent the product. Then find the value of each expression.

a. 0.2×0.3



b. 1.4×0.5

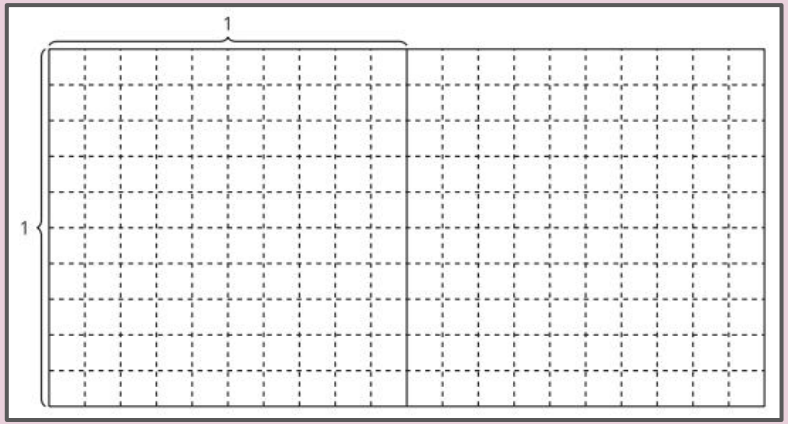


Activity #2

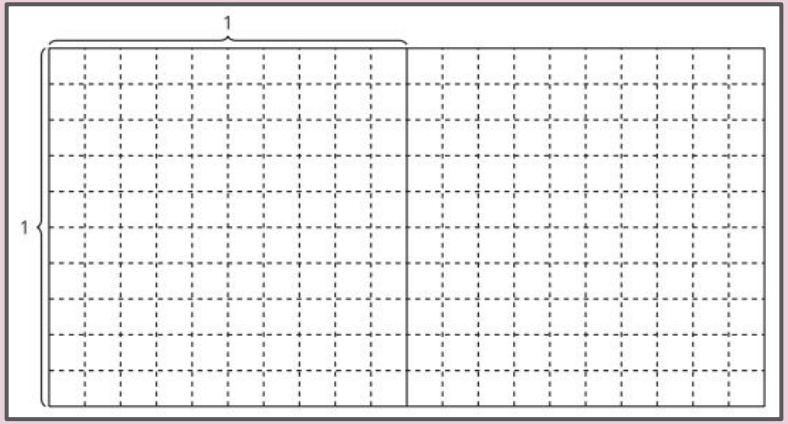
Multiply Tenths

2. Find the value of each expression. Use the grids if they are helpful.

a. 1.3×0.2



b. 1.8×0.7



Activity #2

Multiply Tenths

3. a. Find the value of 4.5 x 8.1 .

b. Show or explain how 45 x 81 can be used to find the value of 4.5 x 8.1

Lesson Synthesis

Today we found products of decimals in tenths using fractions, diagrams, and thinking about place value.

$$4.5 \times 8.1 = 45 \times 0.1 \times 81 \times 0.1$$

How do we know this is true?

How do we know this is true?

$$4.5 \times 8.1 = 45 \times 81 \times 0.01$$

19

Multiply More Decimals

Let’s multiply decimals.

5.NBT.A.1, 5.NBT.B.7

Warm up

True or False: Different Values

Decide if each statement is true or false.

$$2.3 \times 5.1 = 23 \times 51 \times 0.1$$

Be prepared to explain your reasoning.

Warm up

True or False: Different Values

Decide if each statement is true or false.

$$2.3 \times 5.1 = (23 \times 51) \times \frac{1}{100}$$

Be prepared to explain your reasoning.

Warm up

True or False: Different Values

Decide if each statement is true or false.

$$2.3 \times 5.1 = 23 \times 51 \times 0.01$$

Be prepared to explain your reasoning.

Activity #1

Multiply More Decimals

1. Show or explain why each pair of expressions is equivalent.

a. 7.2×5.3 and $(72 \times 53) \times 0.01$

b. 6.5×2.8 and $(65 \times 28) \div 100$

c. 31×0.44 and $(31 \times 44) \times \frac{1}{100}$

2. Calculate the value of the expressions in the previous problem.

Activity #2

Choose Your Strategy

1. Find the products using any method.

$a.\ 7.3 \times 4.2$

$b.\ 38 \times 0.55$

$c.\ 285 \times 0.17$

Lesson Synthesis

Today we looked at different expressions that can be used to find products of decimals using place value understanding and properties of operations.

$$285 \times 0.17$$

What are some different ways you could use to find the product? Which way is your favorite?

Section Summary

In this section, we learned to multiply decimals. First, we learned to use place value relationships and whole number facts to multiply whole numbers by tenths and hundredths. For example,

$$25 \times 0.3 = 25 \times 3 \times 0.1$$

$$25 \times 0.03 = 25 \times 3 \times 0.01$$

Then, we applied this strategy to multiply other decimals.

$$4 \times 1.4 = 4 \times 14 \times 0.1$$

We also learned how to apply other strategies to multiply whole numbers and decimals.

$$4 \times 1.4 = (4 \times 1) + (4 \times 0.4)$$

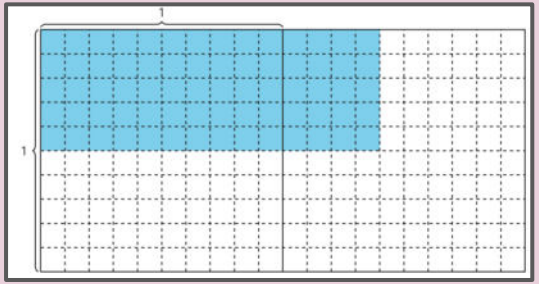
Section Summary

We used area diagrams to understand why $0.1 \times 0.1 = 0.01$

We used this understanding to multiply decimals by decimals.

1.5×0.5

The diagram shows that the area is 14 x 5 x 0.01 or 70 hundredths so that's 0.70



Divide Whole Numbers by 0.1 and 0.01

20

Let’s divide whole numbers by one tenth and one hundredth.

5.NBT.B.7

Warm up

Number Talk: Remember Division

Find the value of each expression mentally.

$$600 \div 10$$

Warm up

Number Talk: Remember Division

Find the value of each expression mentally.

$$6{,}000 \div 10$$

Warm up

Number Talk: Remember Division

Find the value of each expression mentally.

$$600 \div 100$$

Warm up

Number Talk: Remember Division

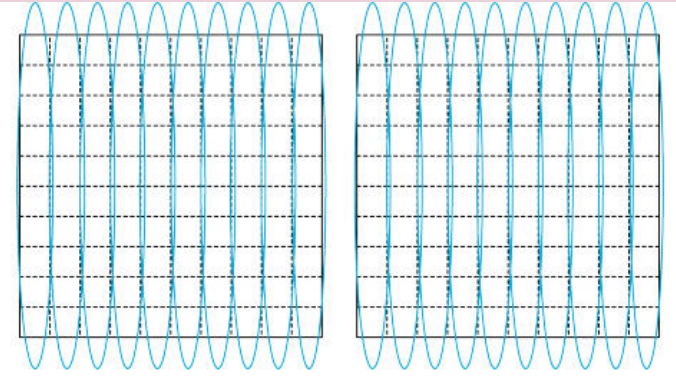
Find the value of each expression mentally.

$$6{,}000 \div 100$$

Activity #1

Interpret Diagrams

1. Explain how the diagram represents 2 ÷ 0.1.

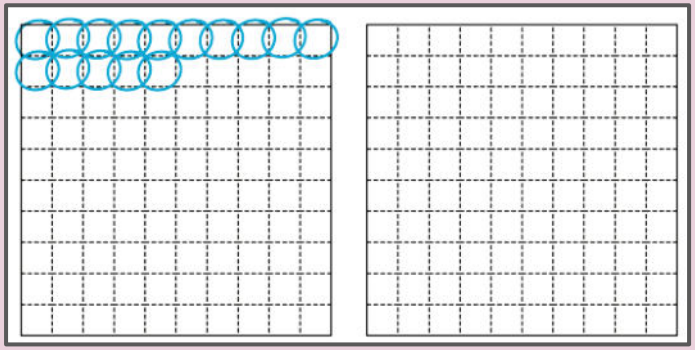


2. What is the value of 2 ÷ 0.1 ?
Show or explain your reasoning.

Activity #1

Interpret Diagrams

3. Andre started to use a diagram to find the value of 2 ÷ 0.01. He doesn't want to draw and count one hundredths anymore. Describe how Andre can find the value of 2 ÷ 0.01 without circling and counting all the one hundredths.



4. What is the value of 2 ÷ 0.01?

Activity #2

Divide Whole Numbers by Decimals

1. Find the value of each expression. Show or explain your reasoning. Use a diagram if it is helpful.

$3 \div 0.1$

$3 \div 0.01$

$4 \div 0.1$

$4 \div 0.01$

2. What patterns do you notice?

3. Describe how you can find the value of any whole number divided by 0.1.

Describe how you can find the value of any whole number divided by 0.01.

Lesson Synthesis

Today, we divided whole numbers by one tenth and one hundredth.

Set A	Set B
$1 \div 0.1 = 10$	$1 \div 0.01 = 100$
$2 \div 0.1 = 20$	$2 \div 0.01 = 200$
$3 \div 0.1 = 30$	$3 \div 0.01 = 300$
$4 \div 0.1 = 40$	$4 \div 0.01 = 400$

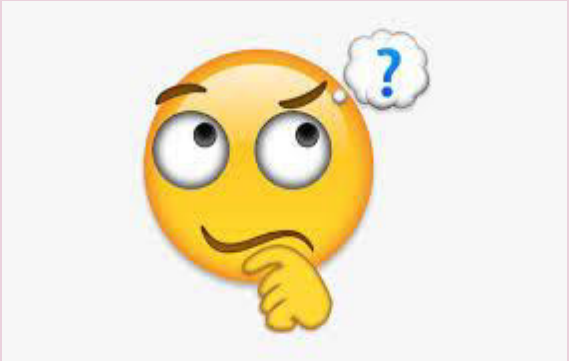
How does the first equation in each set relate to all the other equations in the same set?

Lesson Synthesis

$$5 \div 0.1$$

$$5 \div 0.01$$

Describe to your partner how to evaluate each of these expressions.



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Divide Whole Numbers by Decimals

Let’s divide whole numbers by decimals.

5.NBT.B.7

Warm up

Number Talk:
Tenths and Hundredths

Find the value of each expression mentally.

$$8 \div 1$$

Warm up

Number Talk: Tenths and Hundredths

Find the value of each expression mentally.

$$8 \div 0.1$$

Warm up

Number Talk:
Tenths and Hundredths

Find the value of each expression mentally.

$$8 \div 0.01$$

Warm up

Number Talk:
Tenths and Hundredths

Find the value of each expression mentally.

$$80 \div 0.1$$

Activity #1

Use Grids to Divide Decimals

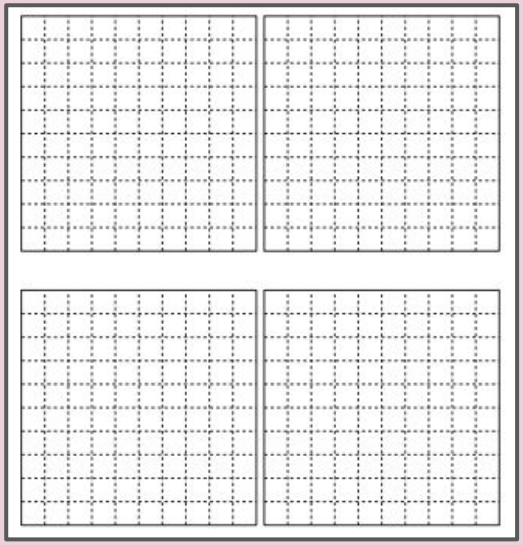
1. Find the value of each expression.
Show or explain your reasoning. Use a diagram if it is helpful.

$1 \div 0.2$

$2 \div 0.2$

$3 \div 0.2$

$4 \div 0.2$



Activity #1

Use Grids to Divide Decimals

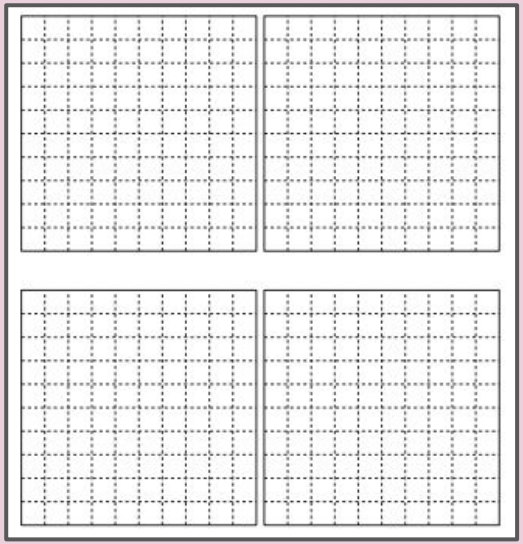
2. Find the value of each expression.
Show or explain your reasoning. Use a diagram if it is helpful.

$1 \div 0.02$

$2 \div 0.02$

$3 \div 0.02$

$4 \div 0.02$



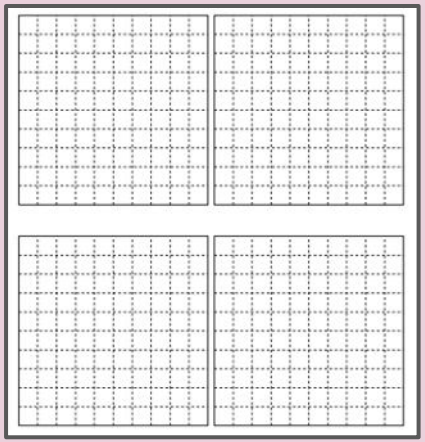
3. What patterns do you notice?

Activity #2

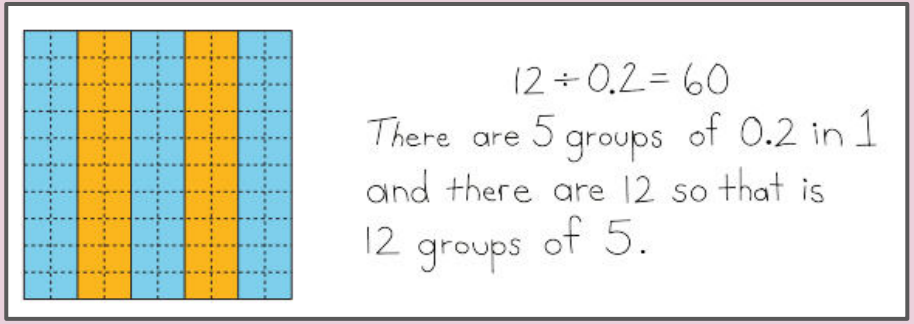
Evaluate Expressions

1. Evaluate the expression.
Use a diagram if it is helpful.

$$12 \div 0.2$$



2. This is the diagram and explanation Tyler used to justify why 12 ÷ 0.2 = 60



Explain how the expression 12 x (1 ÷ 0.2) relates to Tyler's reasoning.

Activity #3

Evaluate Expressions (Optional)

1. Evaluate each expression. Show or explain your reasoning.

$$14 \div 0.5$$

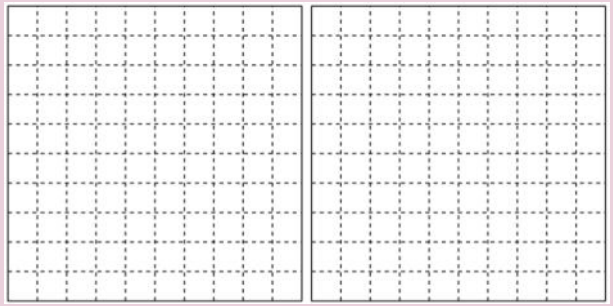
$$4 \div 0.25$$

Lesson Synthesis

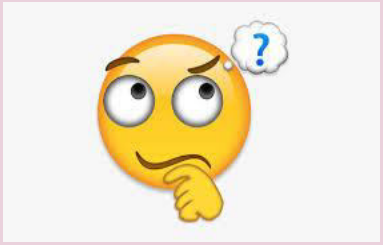
Today we divided whole numbers by decimals

$2 \div 0.2$

$2 \div 0.5$



In both these cases, 2 is being divided by a decimal number. Describe to your partner how you would evaluate each expression.

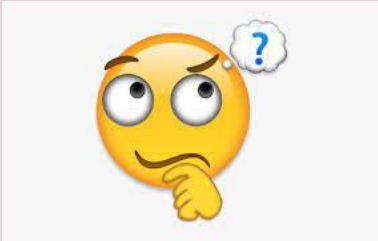


Lesson Synthesis

$2 \div 0.2$

$2 \div 0.5$

How does your strategy for the first two problems change with this set of problems? Why?



What is important to remember when you divide a whole number by a decimal?

22

Divide Decimals by Whole Numbers

Let’s divide decimals by whole numbers.

5.NBT.B.7

Estimation Exploration: Divide by Whole Numbers

Warm up

$$0.42 \div 5$$

Record an estimate that is:

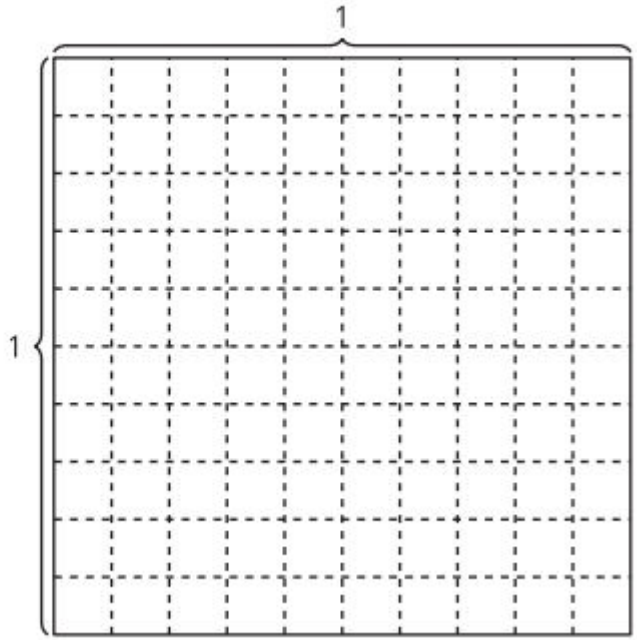
Too low	About right	Too high

Activity #1

Whole Number Groups

The large square represents 1.

1. Evaluate $0.8 \div 4$. Show your reasoning using the diagram.

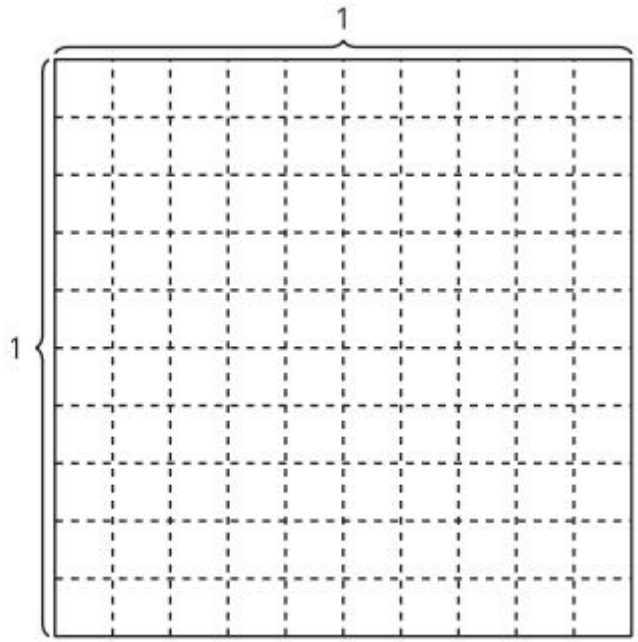


Activity #1

Whole Number Groups

The large square represents 1.

2. Evaluate $0.6 \div 3$. Show your reasoning using the diagram.

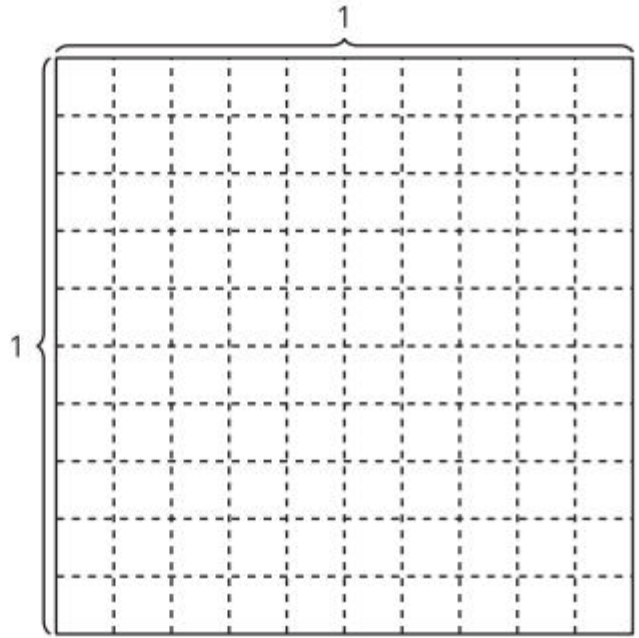


Activity #1

Whole Number Groups

The large square represents 1.

3. Evaluate $0.5 \div 2$. Show your reasoning using the diagram.

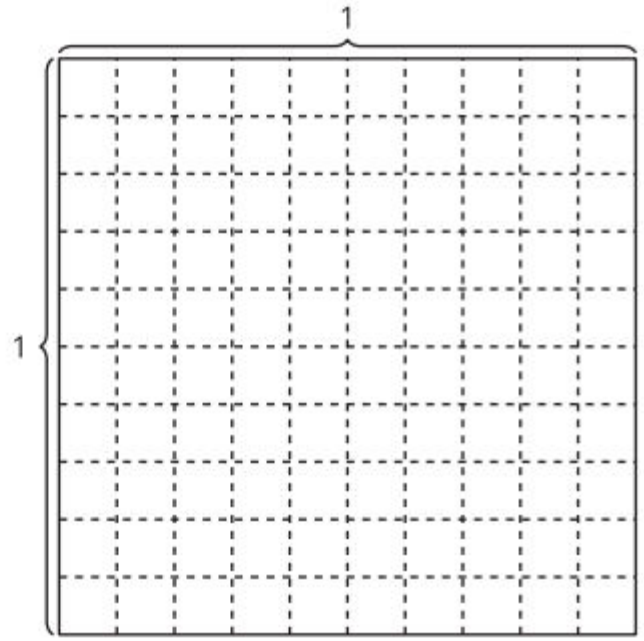


Activity #1

Whole Number Groups

The large square represents 1.

4. Evaluate $0.75 \div 5$. Show your reasoning using the diagram.



Activity #2

Evaluate Expressions

1. Evaluate the expressions in each set.

Set A:	Set B:
$4 \div 2$	$60 \div 4$
$0.4 \div 2$	$6 \div 4$
$0.04 \div 2$	$0.6 \div 4$

2. Explain the patterns you notice in the sets of expressions.

Lesson Synthesis

Today, we divided decimals by whole numbers. What was your favorite strategy and why?

$$0.7 \div 2$$

Describe to your partner how you would evaluate this expression.

23

Reason About Division by Tenths and Hundredths

Let’s divide decimals by decimals.

5.NBT.B.7

Warm up

Number Talk: Same/Different

Find the value of each expression mentally.

$$20 \div 2$$

Warm up

Number Talk: Same/Different

Find the value of each expression mentally.

$$2 \div 0.2$$

Number Talk: Same/Different

Warm up

Find the value of each expression mentally.

$$50 \div 2$$

Warm up

Number Talk: Same/Different

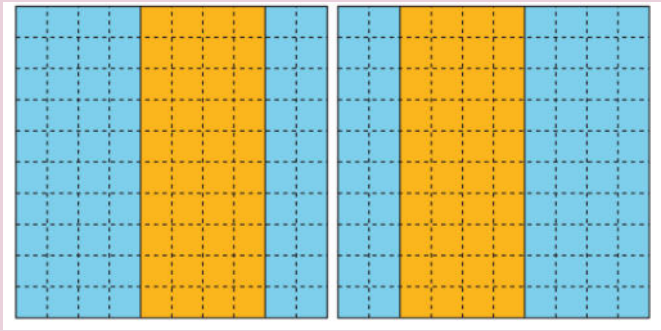
Find the value of each expression mentally.

$$5 \div 0.2$$

Activity #1

Where Do We See It?

1. To find the value of 2 ÷ 0.4 , Jada said she divided 20 tenths into groups of 4 tenths to get the quotient of 5. She drew this diagram.



a. Describe where you see the 20 tenths in the diagram.

b. Describe where you see the groups of 4 tenths.

c. Where is the quotient of 5 in the diagram?

d. Explain how the diagram can represent this expression: 200 ÷ 40

2. Evaluate the quotient. Show or explain your reasoning.

$2 \div 0.04 =$ _____

Divide Decimals by Decimals

Activity #2

1. Evaluate each expression. Show or explain your reasoning.

a. $5 \div 0.1$

b. $5 \div 0.01$

c. $0.5 \div 0.1$

d. $0.5 \div 0.01$

e. $0.02 \div 0.01$

f. $1.53 \div 0.01$

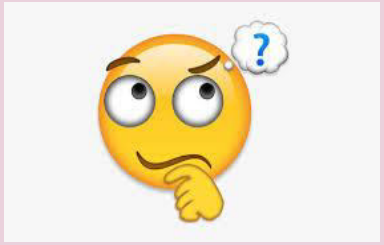
Lesson Synthesis

Today we divided whole numbers by decimals that cannot be divided evenly into 1 whole. We used place value relationships to make sense of these situations. We also used place value relationships to divide decimals by decimals. We reasoned about the number of tenths and hundredths within a given number.

$$3 \div 0.3 = 30 \div 3$$

$$3 \div 0.03 = 300 \div 3$$

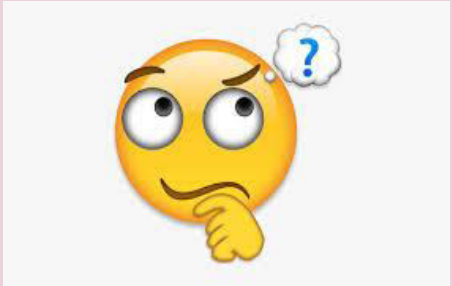
How do we know these equations are true?



Lesson Synthesis

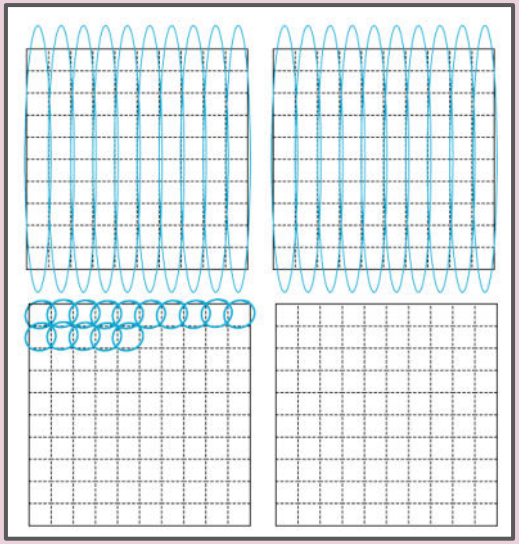
$$1.25 \div 0.01 = 125$$

How do we know this equation is true?



Section Summary

In this section we learned to divide decimals. We used diagrams and equations to explain the reasoning used. First, we noticed patterns when dividing a whole number by one tenth and one hundredth.



Set A	Set B
$1 \div 0.1 = 10$	$1 \div 0.01 = 100$
$2 \div 0.1 = 20$	$2 \div 0.01 = 200$
$3 \div 0.1 = 30$	$3 \div 0.01 = 300$
$4 \div 0.1 = 40$	$4 \div 0.01 = 400$

Section Summary

We learned to multiply a whole number dividend by 10 to figure out how many tenths are in the whole number and to multiply a whole number dividend by 100 to figure out how many hundredths are in the whole number. Then, we applied this strategy to divide whole numbers by any number of tenths or hundredths.

Next we learned how to divide decimals by whole numbers. Here is an example of two strategies we used to evaluate $0.7 \div 2$.

Strategy 1:

$0.7 \div 2 = 0.70 \div 2$
$70 \div 2 = 35$
$0.70 \div 2 = 0.35$

Strategy 2:

$0.7 \div 2 = (0.6 \div 2) + (0.1 \div 2)$
$0.6 \div 2 = 0.3$
$0.1 \div 2 = 0.05$
$0.3 + 0.05 = 0.35$

Section Summary

Finally we noticed and used place value relationships to divide decimals by decimals.

For example, to find the value of $2.87 \div 0.01$, we can think about how many hundredths are in $2 + 0.8 + 0.07$.

There are 200 hundredths in 2 wholes, 80 hundredths in 8 tenths and 7 hundredths in 7 hundredths so the value of $2.87 \div 0.01$ is 287.

24

Book Drive

Let’s plan a book sale fundraiser.

5.NBT.A.3, 5.NBT.B.7

Warm up

Notice and Wonder: Books for Sale

What do you notice?

What do you wonder?

Activity #1

Book Prices

Two schools buy science books for $8 from a publisher to sell at their book sale. School A sells the books for $12. School B sells the books for $12.90.

1. Who do you think sells more science books? Why?
2. How much profit does each school make if they each sell 35 books?
3. School B sells 10 science books. How many science books does School A have to sell to raise about the same amount of money?

Activity #2

Plan a Book Fair

Price list from the publisher:

type of book	price
boxed sets & collections	$24.95
comic books	$2.60
science books	$8.00
chapter books	$9.99
history books	$14.49
audiobooks	$20.00
activity books	$4.50
reference books	$12.00
Spanish language books	$6.00
biographies	$6.05

Plan a book fair:

1. Choose 3–5 types of books you want to order.

2. Decide on the mark-up price for each type of book you chose.

3. Estimate the amount of money your school will raise as a profit with your book sale.

too low	about right	too high

4. Show or explain your reasoning for the estimate. Include the assumptions you made.

Lesson Synthesis

Today, you made assumptions about the book fair.

How did the assumptions you made affect your plan or the money raised at the book fair?