Teachers Guide

GRADE 5 – UNIT 3 – MODULE 2

BRIDGES®
IN MATHEMATICS

Module 2

Adding & Subtracting Decimals

Teacher Masters

Pages renumber with each module.

Student Book Pages

Page numbers correspond to those in the consumable books.

Home Connections Pages

Page numbers correspond to those in the consumable books.

Module 2

Adding & Subtracting Decimals

Overview

Students build on the work they did in the previous module as they deepen their understanding of place value in decimal numbers, equivalencies between decimals, fractions, and money, and adding and subtracting decimals. Three new Work Places help students in each of these areas, and a checkpoint provides information about their understanding of decimal place value. Students also work with models for thousandths and ten-thousandths. At the end of the module, students use a metric number line to place, order, and round decimals.

Planner

Session & Work Places Introduced	P&I	PS	MF	WP	A	HC	DP
Session 1 Extending the Great Wall After a decimal subtraction problem string, students consider place value in decimal numbers and then use a new model to investigate thousandths and ten-thousandths.		●				●	●
Session 2 Draw & Compare Decimals This session begins with another decimal subtraction problem string. Then the teacher introduces Draw & Compare Decimals, which becomes Work Place 3B. Students play against the teacher first, and then with a partner. **Work Place 3B** Draw & Compare Decimals Players use Number Cards to create either the largest or smallest decimal possible. They compare their decimals to determine who wins the round.		●		●			●
Session 3 Round & Add Tenths The session opens with a warm-up game of I Have, You Need, followed by discussion about a problem in which two decimal numbers are compared. Then students complete a work sample about decimal equivalencies. The teacher introduces Work Place 3C Round & Add Tenths by playing a demonstration game with the class, after which the students play the game again in pairs. **Work Place 3C** Round & Add Tenths Players roll dice and form numbers with digits in the ones and tenths places. They round their numbers to the nearest whole number and place them on a number line.	●			●	●	●	●
Session 4 Target One This session opens with a quick warm-up game of I Have, You Need with decimal combinations of 1, followed by a checkpoint. When students complete the checkpoint, the teacher introduces Work Place 3C Target One, a game designed to provide practice with decimal place value and adding and subtracting decimal numbers. **Work Place 3D** Target One Players choose four Number Cards to make two numbers whose sum is as close to 1 as possible. After five rounds, the player with the lower score wins the game.	●			●	●		●
Session 5 Charting Fraction & Decimal Equivalencies Today, students work as a whole class and then in small groups to find and record the decimal equivalencies for a variety of common fractions. As they finish, they go to Work Places.	●			●		●	●
Session 6 Fraction & Decimal Equivalencies The session begins with a decimal subtraction string that highlights the constant difference strategy. Then students discuss and complete the Fractions & Decimals Chart they started in the previous session. Students spend the remaining time visiting Work Places.	●	●		●			●
Session 7 Decimals on a Number Line This session starts with a decimal subtraction string designed to reinforce the constant difference strategy. Then students use a measuring tape marked in centimeters and millimeters to think about ordering and rounding decimals, and complete a related assignment in their Student Books.	●	●				●	●

P&I – Problems & Investigations, **PS** – Problem String, **MF** – Math Forum, **WP** – Work Place, **A** – Assessment, **HC** – Home Connection, **DP** – Daily Practice

Materials Preparation

Each session includes a complete list of the materials you'll need to conduct the session, as well as notes about any preparation you'll need to do in advance. If you would like to prepare materials ahead of time for the entire module, you can use this to-do list.

Task		Done
Copies	Run copies of Teacher Masters T1–T12 according to the instructions at the top of each master.	
	Run display copies of Student Book pages 79–80 and 93 according to the instructions below the sessions' Materials charts.	
	If students do not have their own Student Books, run a class set of Student Book pages 79–94.	
	If students do not have their own Home Connections books, run a class set of the assignments for this module using pages 45–52 in the Home Connections Book.	
Work Place Preparation	Prepare the materials for Work Places 3B–3D using the lists of materials on the Work Place Guides (Teacher Masters T2, T6 & T9).	
Paper Cutting	Cut apart the Number Line Fractions Teacher Master T11 according to the instructions at the top of the master.	
Special Items	Get a 1′ × 4′ piece of light-colored butcher paper prior to Session 6 and tape a centimeter measuring tape that is folded back on itself at the 100 cm mark to its center. See Session 6 Preparation for details.	

Additional Resources

Please see this module's Resources section of the Bridges Educator site for a collection of resources you can use with students to supplement your instruction.

Session 1

Extending the Great Wall

Summary

After a decimal subtraction problem string, students consider place value in decimal numbers and then use a new model to investigate thousandths and ten-thousandths. Finally, the teacher introduces the Modeling Decimals Home Connection.

Skills & Concepts

- Demonstrate an understanding that in a multi-digit number, each digit represents ten times what it represents in the place to its right and one-tenth what it represents in the place to its left (5.NBT.1)
- Read decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction (5.NBT.7)
- Model with mathematics (5.MP.4)
- Look for and make use of structure (5.MP.7)

Materials

Copies	Kit Materials	Classroom Materials
Problem String Decimal Subtraction		
		• student math journals
Problems & Investigations Thousandths & Ten Thousandths on the Great Wall		
TM T1 Grid Instructions **SB 79-80*** Decimal Grid		• The Great Wall of Base Ten Teacher Master (with construction paper label from Module 1, Session 4) • calculators (class set)
Home Connection		
HC 45–46 Modeling Decimals		
Daily Practice		
SB 81 Thinking About Thousandths		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master. ** Run several copies of this page for display.*

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

decimal*
difference*
fractions*
removal
ten-thousandth
thousandth*

Problem String

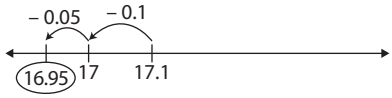
Decimal Subtraction

1 Open the session by telling students they will work with decimals by participating in a subtraction problem string, doing a decimal activity, and exploring decimals on a new grid.

2 Then ask them to date and label the next available math journal page for today's problem string.

- Deliver each problem in the string one at a time by writing it on the board.
  - » Have students record and solve the problem in their journals.
  - » Circulate as they are working to look for students who use removal when the numbers are far apart and differencing when they are close together.
  - » Have them put up their thumbs when they are ready to share their solutions and strategies.
  - » When you see several thumbs up, invite a few students to share the answer. Record all answers without comment or indication that any of them are correct or incorrect.
  - » Then invite one or two volunteers to explain how they got their answers.
  - » Model their strategies on the board using open number lines.

Problem String Decimal Subtraction, Part 1

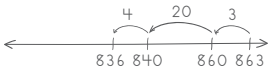
Problems	Sample Strategies & Recording	Connections
43 – 4	Call on a student who used removal to solve this problem. 	**Big Idea** In general, removal is a more efficient strategy when the numbers are far away from each other, and finding the distance is more efficient when numbers are close together. Some students may always choose to remove when given a subtraction problem. Validate both strategies, but have students who alternate verbalize how and why they choose one strategy over the other.
52 – 49	Call on a student who used differencing to solve this problem. 	
19.2 – 18.9	Call on a student who used differencing to solve this problem. 	To help students transition from whole numbers to decimals, read each of these problems to the class in terms of money and then in terms of decimals after you write it on the board (e.g., nineteen dollars and twenty cents minus eighteen dollars and ninety cents; nineteen and two tenths minus eighteen and nine tenths).
17.1 – 0.15	Call on a student who used removal to solve this problem. 	

3 Ask if there are any students who removed for 19.2 – 18.9 or added up (found the distance) for 17.1 – 0.15. Encourage students to think about when they might prefer one strategy over the other.

Removal vs. Differencing

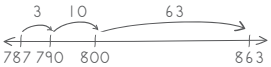
The problems in today's string alternate between combinations that are best solved using a removal strategy and combinations that are solved more efficiently by finding the difference between two numbers. Students will discover that removal is more efficient and effective when the numbers are far away from each other, while finding the difference is more efficient when the numbers are close together.

Both strategies are easily modeled on the open number line. The removal strategy involves hopping backward the amount specified by the subtrahend, preferably to a friendly number first, and then by chunks that are as efficient as possible. To solve 863 – 27, for example, one might take 3 away to get to 860, then remove 20 more, and finally remove the last 4 to get an answer of 836.



863 – 27 = 836

The removal strategy becomes inefficient when the minuend and the subtrahend are close, however. Consider 863 – 787, for example. Starting at 863 and removing 787, no matter how large the increments, is tedious. On the other hand, a differencing strategy, which involves adding on to find the difference—literally the distance—between the subtrahend and the minuend is much easier.



3 + 10 + 63 = 76,
so 863 – 787 = 76

Teacher *I'm looking back at the problem that was 19.2 – 18.9 and thinking about what Amanda did. Did any of you remove for this problem?*

Quinlan *I did. But I wish I would have done it that other way. I had to take away a few times, so it took me longer.*

Teacher *So you think adding up, or finding the distance, was a better choice for that problem?*

Quinlan *Yes.*

Teacher *And what about for 17.1 –0.15? Did anyone find the distance between those two numbers? No? Why not?*

Willie *That would be silly! You would have to make a lot of jumps. It's much faster to just subtract.*

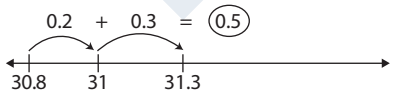
Teacher *You mean, for this problem, it's more efficient to remove the 0.15?*

Willie *Yep.*

Teacher *So, it sounds like sometimes it is more efficient to find the distance and sometimes it is more efficient to remove. Is that right? How do we know when to do each? Can you think about that? Let's do a few more problems.*

4 Pose the last two problems. Before students solve each, ask them to think about whether it would be quicker to find the distance or remove, and press them to explain why.

Problem String Decimal Subtraction, Part 2

Problems	Sample Strategies & Recording	Connections
34.3 – 0.4	Students will likely suggest that removal—simply taking 4 tenths or 40 cents away—is faster and easier.  	Here again, you'll want to read each problem after you've written it on the board in terms of money and then decimals to scaffold students' thinking. Many more students will be able to think sensibly about thirty-four dollars and thirty cents minus forty cents than thirty-four and three tenths minus four tenths.
31.3 – 30.8	Students will likely agree that finding the difference, or the distance, between the two numbers is faster and easier because they are so close to one another.  	

5 End the string by asking student to look back at the six problems and try to verbalize what the "removing" problems and the "find the distance" problems have in common.

Teacher *Does anyone think they can put into words when you would tell someone that it's a better idea to remove?*

Students *When you only have to take off a little bit.*

When the first number is big and the number you are taking off is small.

When you would just have to make small jumps.

Teacher *When you would want to find the distance between the numbers?*

Students *When they are both big. Or both small.*

I think it's really about when they are almost the same number.

Yeah, when they are close together.

6 Have students turn to the handbook section in the back of their math journals and add an entry for the removal strategy versus the finding the distance strategy.

Have students write each term, a brief explanation, and an example from today's string.

ELL/SUPPORT Have students verbalize the strategy before adding anything to their journals. You can also work with the class to write an explanation on the board, and then have them copy it into their journals.

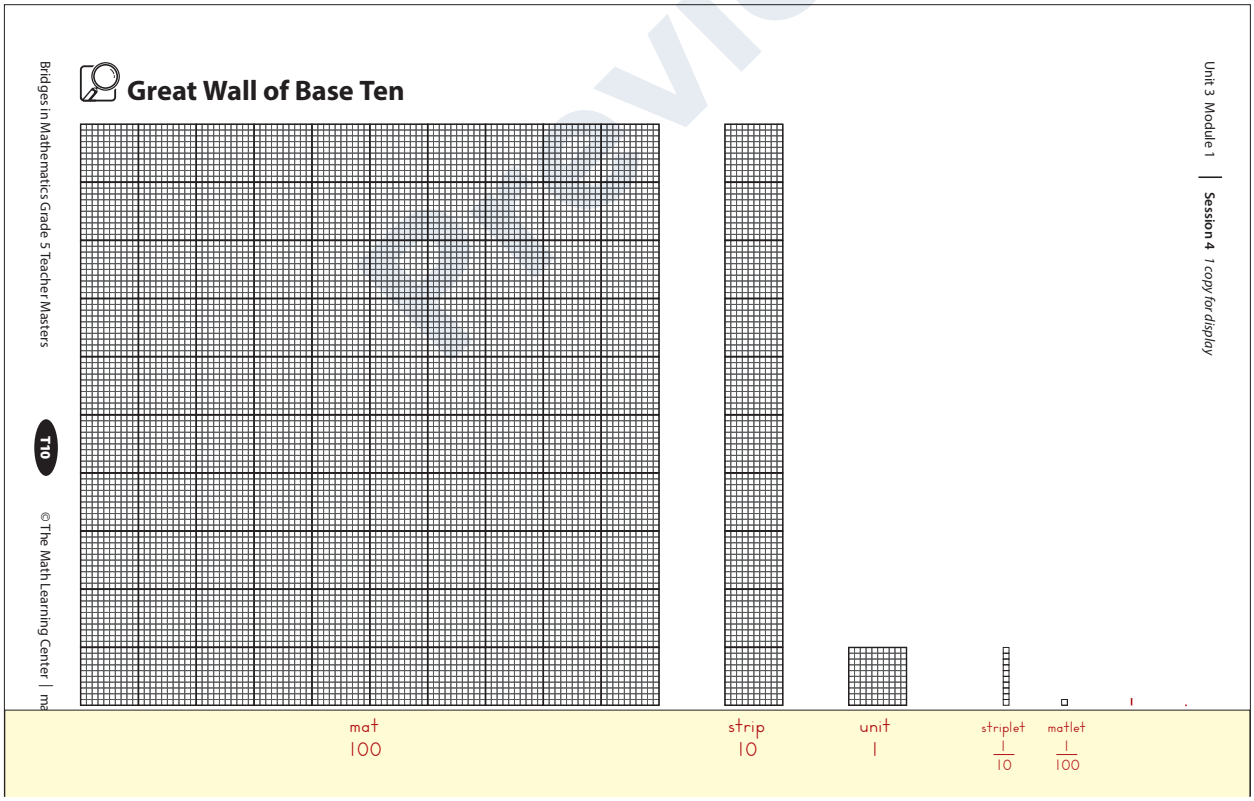
CHALLENGE Have students create their own problem as an example. Challenge them to create a problem for which a removal strategy is the most efficient.

Problems & Investigations

Thousandths & Ten Thousandths on the Great Wall

7 Move into the next part of the session by displaying the Great Wall of Base Ten Teacher Master along with the strip of yellow construction paper with the latest labels (from Module 1, Session 4).

- Give students a minute to examine the display quietly, then share observations with a neighbor.
- Then note with them that the last two pieces on the far right—those that are almost too tiny to see—aren't yet labeled. Invite students to make predictions about how those two pieces might be labeled, based on what part of the mat, now assigned a value of 1, each represents.



Students *I have no idea about those last two pieces. They're too small to even see them.*

I'm thinking that when the pieces get bigger, they go 1, 10, 100, then 1,000. I wonder if it will do the same thing going backward. Maybe that next little piece after the one-hundredth would be the one-thousandth.

I don't think you can make the pieces that small.

One-thousandth of a unit? That's weird!

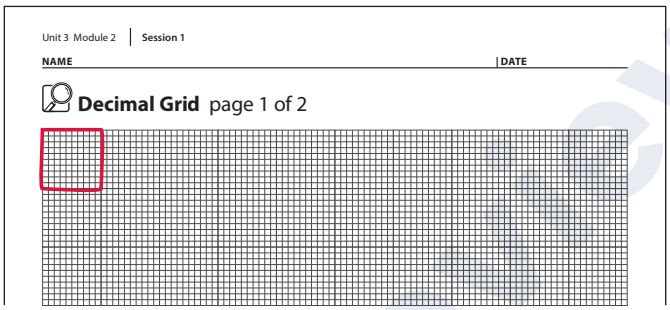
Then the one after that would have to be the one ten-thousandth. That's really weird!

8 Now explain that you're going to work with a new grid that might help in figuring out what fraction of a unit each of the two smallest pieces on the Great Wall is.

- Display your copy of the Decimal Grid Student Book page, and have students find the page in their books.
- Ask them to examine the grid carefully and record at least three mathematical observations about it in their journals.
- After students have had a few minutes to write, ask them to turn and talk to a partner about their ideas. Then call on volunteers to share their thinking with the class.

Barry *Each of the little squares has 100 tinier squares inside it.*

Teacher *Which little squares do you mean? Can you come up and show us?*


Unit 3 Module 2 | Session 1

NAME | DATE

Decimal Grid page 1 of 2

Barry *See? Each of those is like a mat, and there are 100 of them on the whole grid.*

Abe *I think there are 10,000 teeny tiny little squares on the whole thing.*

Teacher *Do the rest of you agree? Would you bet your next recess on it? Take a minute to talk it over with the person sitting next to you. Do you really believe there are 10,000 little squares on this grid?*

Sasha *Can we use our calculators?*

Teacher *Sure!*

Maria *OK, we think he is right, and we'd bet our recess on it.*

Eli *We agree. Each one of the little squares has 100 little squares on it, and there are 100 of those, so 100 times 100 is 10,000. There are 10,000 of the littlest squares.*

- Explain that the grid is a greatly magnified version of the ten-by-ten grid (the base ten mat) they have been using and will serve as the unit today.

9 Display the Grid Instructions Teacher Master and review the directions with the class. Then have students begin work with a partner.

- Remind students that while they can help each other with anything that seems confusing, each student will be responsible for coloring and labeling her own grid.

Unit 3 Module 2 | Session 1 *1 copy for display*

Grid Instructions

- Color $\frac{1}{10}$ (0.1) of the grid yellow.
- Color $\frac{1}{100}$ (0.01) of the grid green.
- Color $\frac{1}{1,000}$ (0.001) of the grid blue.
- Color $\frac{1}{10,000}$ (0.0001) of the grid red.

When you color in a fraction, be sure that all the squares you color share at least one side with each other.

Label each of the fractions you color with both fraction and decimal names. When you're finished, share your papers with another pair. If your results don't match, see if you can find the problem and fix it. Be prepared to explain your thinking to the class.

- Give students ample time to wrestle with these problems before you reconvene the class.
- As students work, circulate to make observations and provide differentiated instruction.

SUPPORT Use questions to help students identify each fractional part of the grid. For coloring 1/10 of the grid, have them think about the grid as 10 equal pieces. Can they see 10 equal pieces? Then have them shade in one of the pieces. Continue with the other fractions.

CHALLENGE Ask students who finish well ahead of their classmates to color and label other fractions and decimals on their grid (5/100, 61/1,000, 0.125, 0.0342, and so on). You might assign fractions or ask students to create their own.

10 When most students have completed the tasks, reconvene the class. Ask pairs to share their solutions by outlining each fraction on the display.

Most students will probably have found it relatively easy to identify a tenth, a hundredth, and perhaps a ten-thousandth. Identifying the thousandth may seem a bit more challenging.

Shanice *It was pretty easy to see that the tenth was one of the long strips and the hundredth was one of the small squares, like this.*

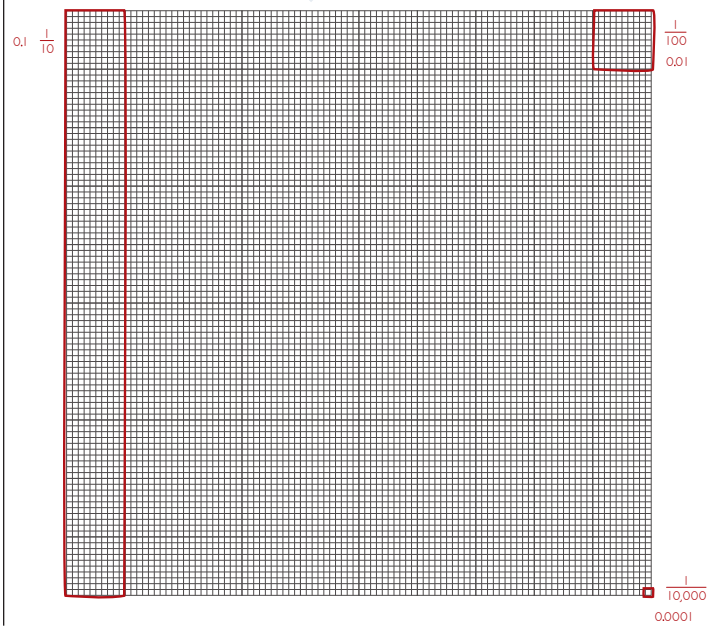
Darius *We knew the ten-thousandth had to be the teeniest square on there because earlier we all figured out there were 10,000 teeny squares on the whole grid.*

Enrico *We tried, but we couldn't find the thousandth.*

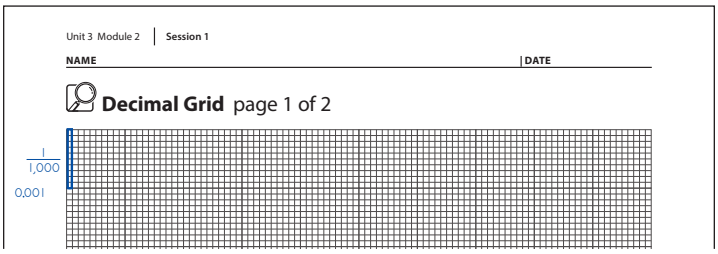
Unit 3 Module 2 | Session 1

NAME | DATE

Decimal Grid page 1 of 2



Jada *We had a hard time with it, too. Finally, we looked at the Great Wall and remembered that a thousandth is a little skinny strip. Then we found it here. See? Each one of these little strips is a thousandth.*



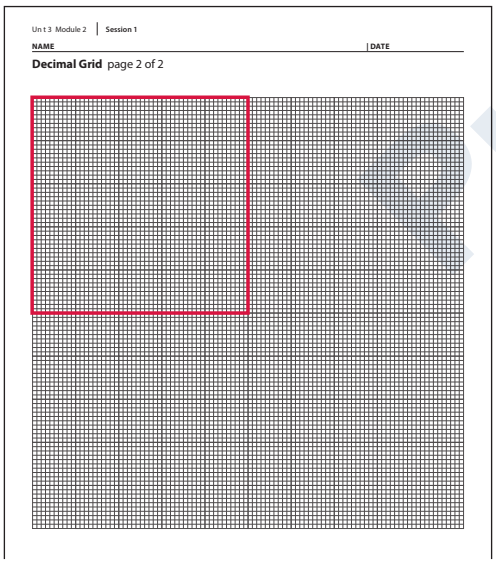
Ramona *We got the same thing, but we did it with numbers. We started thinking about that skinny little strip and we said, OK, there are 10 of those in each small square. There are 100 of those small squares, and 10 times 100 is 1,000, so that must be the thousandth.*

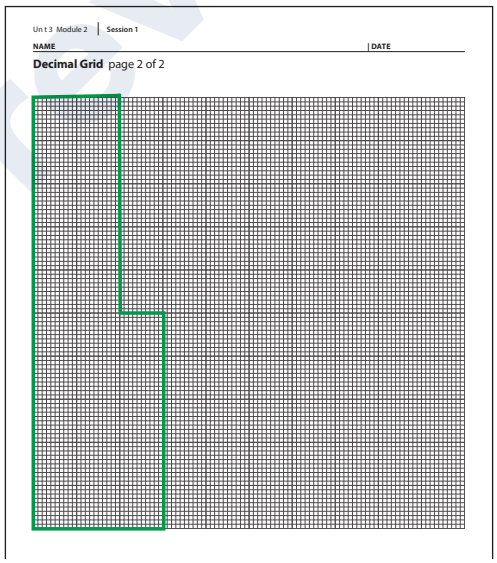
11 Have students turn to the second Decimal Grid Student Book page so they have a new grid to work with. Ask them to outline one-fourth of the grid in pencil and then check with a neighbor to confirm accuracy.

Be sure students understand that for this activity any squares they mark on the grid need to be contiguous, sharing at least one side with the others. Then ask a couple of volunteers to share their solutions where everyone can see.

Students *I outlined a square section that took up one-fourth of the whole grid.*

I know that one-fourth of 100 is 25, so I just marked 2 rows of 10 dotted boxes and a 5 like this.





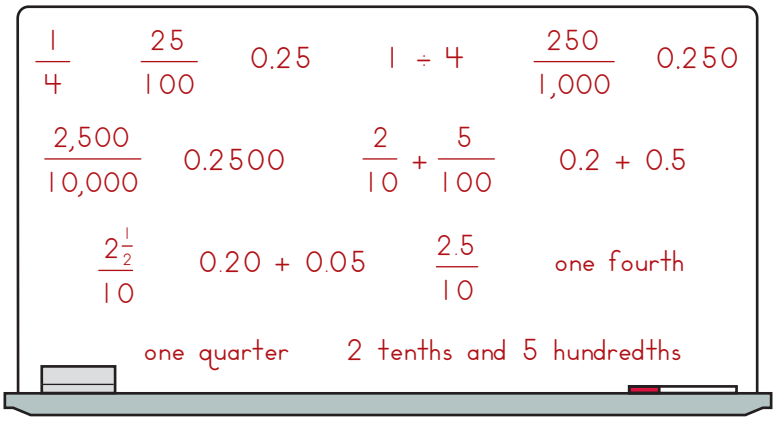
Once students have confirmed the accuracy of their markings, have them go over the markings in crayon so they show up better.

12 Have students record in their journals as many ways as they can think of to express the value of the part they outlined, using fractions and decimal numbers.

Encourage students to share their ideas and their reasoning with neighbors. Circulate as students work to talk with them informally about their ideas.

13 Then reconvene the class and ask students to share their ideas while you record where everyone can see them.

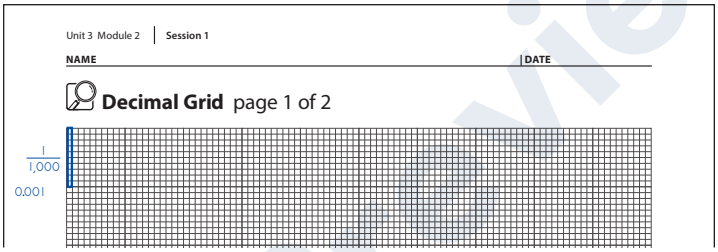
Model the decimal notation for fractions like $\frac{25}{100}$, $\frac{250}{1,000}$, and $2,\frac{500}{10,000}$. If debate or confusion arises, ask students to look carefully at the decimal grid to confirm or disprove the proposed idea.



Kiara *We said another way to name this fraction is $\frac{250}{1,000}$.*

Teacher *So there are 250 thousandths in one-fourth of the grid? How did you figure that out?*

Dylan *Well, here's 1 thousandth, right? And there are 10 of them in each dotted line box, in each hundredth, on this grid. So when we colored in 25 of the hundredth boxes, that was just like coloring in 250 thousandths because 25 times 10 is 250.*



Andre *We agree, and we also said that it's the same as 2,500 ten thousandths. Each of the tiniest boxes on the grid is a ten thousandth and there are 100 of them in each hundredth, so 25 times 100 is 2,500.*

14 After students have shared their ideas, give them a few minutes to explore fractions and decimals on their calculators.

- Write ¼ and ask students to enter 1 ÷ 4 on their calculators. Talk about how the answer relates to all the work they have just done.
- Then have students use their calculators to find $\frac{25}{100}$ (25 ÷ 100), $\frac{250}{1,000}$ (250 ÷ 1,000), and $2,\frac{500}{10,000}$ (2,500 ÷ 10,000). What do they discover as they use the calculator for all of these problems?

Students *We got 0.25 because that means the same as ¼.*

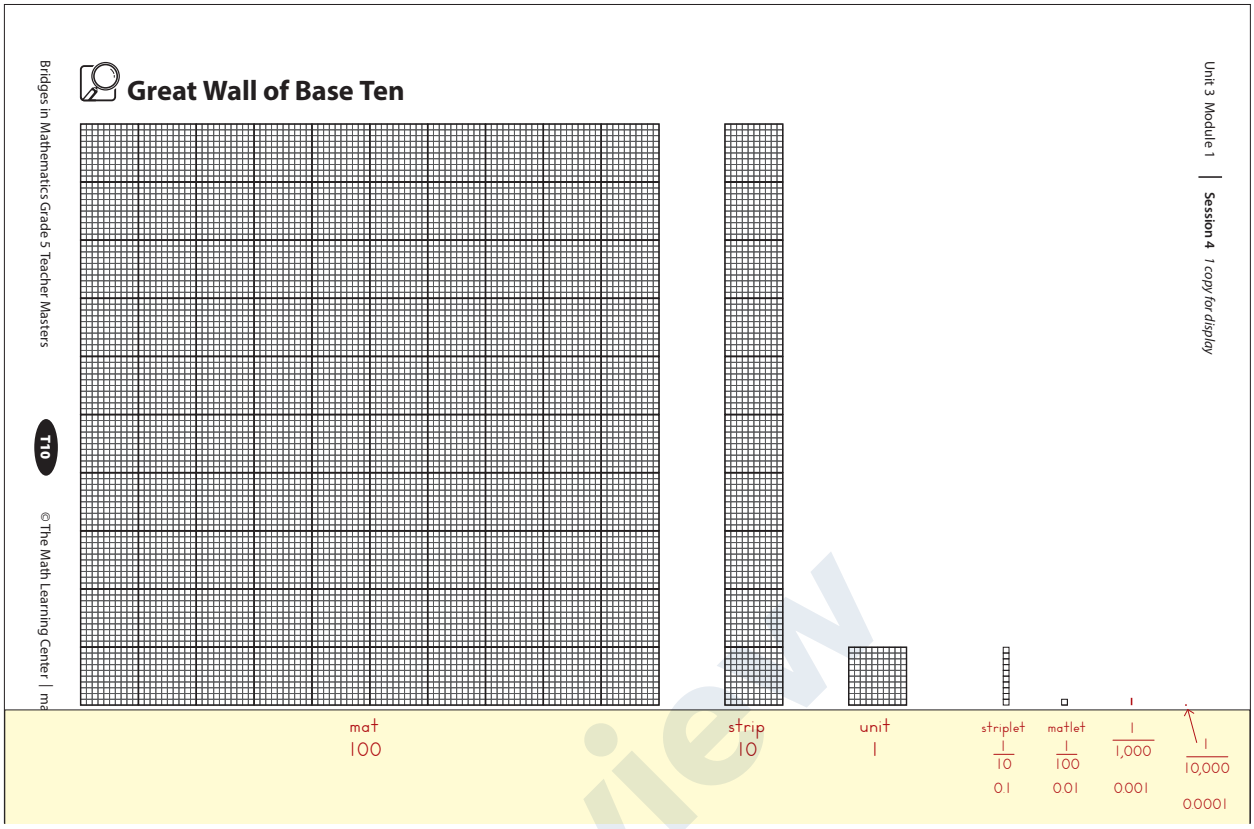
0.25 is almost the same thing you'd write for 25 cents, and that's a quarter of a dollar.

If you remember that the grid is worth 1, finding a fourth of it is like dividing it into 4 parts.

There are 100 hundredths on the grid, so a quarter of them would be $\frac{25}{100}$, and 0.25 is how you write that fraction with decimals.

15 Finally, display the Great Wall of Base Ten Teacher Master, the original labels still covered by the strip of construction paper, and work with input from the students to identify and label the last two pieces on the sheet.

Take the opportunity to review the decimal notation for each fraction by writing those in on the yellow strip as well.



Home Connection

16 Introduce and assign the Modeling Decimals Home Connection, which provides more practice with the following skills:

- Read and write decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Solve story problems involving addition of fractions referring to the same whole, with like and unlike denominators (5.NF.2)

Daily Practice

The optional Thinking About Thousandths Student Book page provides additional opportunities to apply the following skills:

- Write decimals to thousandths with base ten numerals, number names, and in expanded form (5.NBT.3a)
- Compare pairs of decimals to thousandths, based on an understanding of what the digit in each place represents (5.NBT.3b)

Session 2
Draw & Compare Decimals

Summary

This session begins with another decimal subtraction problem string. Then the teacher introduces Draw & Compare Decimals, which becomes Work Place 3B. Students play against the teacher first and then with a partner.

Skills & Concepts

- Demonstrate an understanding that in a multi-digit number, each digit represents ten times what it represents in the place to its right and one-tenth what it represents in the place to its left (5.NBT.1)
- Read and decimals to thousandths represented with base ten numerals and number names (5.NBT.3a)
- Compare pairs of decimals to thousandths, based on an understanding of what the digit in each place represents (5.NBT.3b)
- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction (5.NBT.7)
- Make sense of problems and persevere in solving them (5.MP.1)
- Model with mathematics (5.MP.4)

Materials

Copies	Kit Materials	Classroom Materials
Problem String Decimal Subtraction String		
		• student math journals
Work Places Introducing Work Place 3B Draw & Compare Decimals		
TM T2 Work Place Guide 3B Draw & Compare Decimals **TM T3** 3B Draw & Compare Decimals Record Sheet **SB 82*** Work Place Instructions 3B Draw & Compare Decimals	• Number Cards (1 deck per student pair, 10s and wild cards removed) • spinner overlay, 1 per student pair	
Daily Practice		
SB 83 Playing Draw & Compare Decimals		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master.
** Run 1 copy of this page for use by the teacher and other adult helpers during Work Place time.*

Preparation

In today's session, you'll introduce Work Place 3B Draw & Compare Decimals, which takes the place of Work Place 1C Beat the Calculator. Before this session, you should review the Work Place Guide, as well as the Work Place Instructions. Make copies of the 3B Draw & Compare Decimals Record Sheet for use today, and store the rest in the Work Place 3B Draw & Compare Decimals tray.

Problem String

Decimal Subtraction String

1 Open the session by telling students they will work with decimals by participating in another subtraction problem string, and then learning a new Work Place, Draw & Compare Decimals.

2 Have students date and label the next available math journal page for today's problem string.

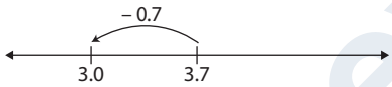
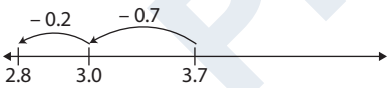
The purpose of today's problem string is to emphasize the strategy of getting to a "friendly" number. The first six problems are paired to suggest a way students can think about getting to a friendly number, while the final two problems do not have "helper" problems.

3 Deliver each problem in the string one at a time by writing it on the board.

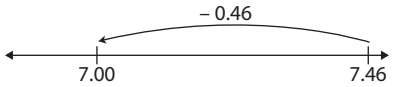
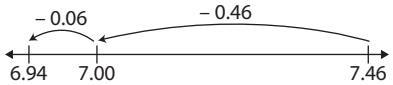
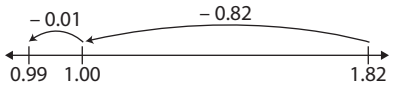
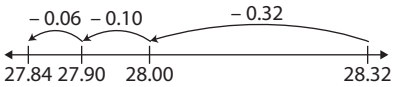
For each of the problems in today's string:

- Present the problem. Be flexible in the way you name decimals in order to help students make connections between fractions, decimals, and money. Some students will still have much better access to these problems if they are posed in terms of money.
- Allow students time to solve the problem and model their thinking in their journals.
- Ask students to share their thinking, and model strategies on the board with a number line.
- Look for students who subtracted to get to a friendly number, and then removed the rest.

Problem String Decimal Subtraction

Problems	Sample Strategies & Recording	Connections
3.7 – 0.7		**Big Idea** These two problems are paired in such a way as to encourage students to jump to the nearest friendly number (3.0 in this case), and then remove the rest. Many students will likely use a removal strategy to subtract 7/10 (or 70 cents, in money terms) from 3 7/10 (3 dollars and 70 cents). When you call on students to share their strategies for the second combination, see if you can find a student who used the results of the first problem to inform her work on the second.
3.7 – 0.9		
4.2 – 0.2		In discussing 4.2 –0.3, emphasize the use of getting to a friendly number, 4.0, first, and then jumping back another tenth. Press students to explain what they are taking away in both problems—tenths, or dimes.
4.2 – 0.3	Again, find a student who used the first of the two, the helper problem, to solve the second one. 	

Problem string continued on next page

Problems	Sample Strategies & Recording	Connections
7.46 – 0.46	After you record each of the next two problems on the board, have students read it with you as a decimal combination, and then as a money combination. 	Thinking about the first problem in terms of money—7 dollars and 46 cents minus 46 cents—and then using the result to solve the second problem, again in terms of money, will scaffold students' work. For some it may be easier to understand that they are removing 6 more hundredths in the second problem if they can think of the hundredths as pennies.
7.46 – 0.52	Again look for students who are able to use the results of the first problem to help solve the second. 	
1.82 – 0.83	For this problem and the next, find students who use the "get to a friendly number strategy" even though a helper problem is not offered. 	As students explain their thinking and you model it on the board, continue to work with the class to be very clear about what they're removing. In the first problem, it's 83 hundredths, or 83 cents. In the second, it's 48 hundredths, or 48 cents.
28.32 – 0.48		

Work Places

Introducing Work Place 3B Draw & Compare Decimals

4 Introduce the game Draw & Compare Decimals.

- Display the 3B Draw & Compare Decimals Record Sheet where everyone can see it.
- Explain that the game will help students compare and describe the value of decimals to the thousandths place.

5 Briefly summarize the game before playing against the class.

Players draw five Number Cards and use three to create the largest or smallest decimal possible, as determined by a more or less spinner. After both players build their decimals, they compare to determine the winner of the round. The player who won the most rounds out of five is the winner.

6 Play a game against the class. Use your copy of the Work Place Instructions 3B Draw & Compare Decimals Student Book page as needed.

> ***Teacher*** *I drew 3, 8, 6, 7, and 0. I need to write those on the record sheet. I think I will make the decimal .360 and save the 8 and 7 for the class to use. Who can read the decimal I created?*
>
> ***Malia*** *That's three hundred sixty thousandths.*
>
> ***Teacher*** *Thanks, your turn. Raul, draw three cards for the class please.*
>
> ***Raul*** *We get 2, 1, and 5.*
>
> ***Teacher*** *Turn to a neighbor talk about what decimal you'd like to make. Remember that we are playing for "less."*

Students *I think we should make 0.125 because it's the smallest number we can create.*

We can make anything that starts with a 1, like 0.182 or 0.175.

Or starts with a 2.

Teacher *Can you tell us why you say that you can make any number that starts with a 1 or 2?*

Students *Because you have a three in the tenths place, so we would only have 1 or 2 tenths.*

Teacher *What do you want to play?*

Raul *Let's make 0.125, since it's the smallest.*

Teacher *OK, I will record that for you. Now we need to compare to see who won the round. We are playing for less…*

Students *So, we won!*

You made 0.360 and we made 0.125.

Teacher *But my decimal ends with a zero, and yours ends with a 5. Doesn't that mean mine is smaller? Talk with a neighbor about that.*

Pose questions like the following to promote flexible thinking and strategy development while you play:

- How can you be sure you made the smallest or largest decimal possible?
- Is there ever a reason to not make the smallest or largest decimal possible?
- How do the wild cards change the game?

7 Ask students to turn to a partner to summarize the directions for Draw & Compare Decimals.

8 Ask students if they have any questions about how to play the game. Then have students get the materials they need to play Draw & Compare Decimals with a partner.

As students play, circulate to observe, answer questions, and provide differentiated instruction as suggested on the Work Place Guide.

Daily Practice

The optional Playing Draw & Compare Decimals Student Book page provides additional opportunities to apply the following skills:

- Compare pairs of decimals to thousandths, based on an understanding of what the digit in each place represents (5.NBT.3b)
- Add decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)

Session 3

Round & Add Tenths

Summary

The session opens with a warm-up game of I Have, You Need, followed by discussion about a problem in which two decimal numbers are compared. Then students complete a Work Sample about decimal equivalencies. The teacher introduces Work Place 3C Round & Add Tenths by playing a demonstration game with the class, after which the students play the game again in pairs. Finally, the teacher introduces the Decimal & Fraction Grids Home Connection.

Skills & Concepts

- Read and write decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Compare pairs of decimals to thousandths, based on an understanding of what the digit in each place represents (5.NBT.3b)
- Round decimals to the nearest one (5.NBT.4)
- Add decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)
- Construct viable arguments and critique the reasoning of others (5.MP.3)
- Look for and make use of structure (5.MP.7)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations Decimal Warm-Ups		
TM T4 Comparing Decimal Numbers	• base ten area pieces	
Assessment Decimal Equivalencies Work Sample		
TM T5 Decimal Equivalencies Work Sample	• base ten area pieces	
Work Places Introducing Work Place 3C Round & Add Tenths		
TM T6 Work Place Guide 3C Round & Add Tenths **TM T7** 3C Round & Add Tenths Record Sheet **SB 84*** Work Place Instructions 3C Round & Add Tenths	• dice numbered 0–5, half-class set • dice numbered 4–9, half-class set	• colored pencils, 1 red and 1 blue for each student pair • student math journals
Home Connection		
HC 47–48 Fraction & Decimal Grids		
Daily Practice		
SB 85 Model, Add & Subtract Decimals		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master.
** Run 1 copy of this page for use by the teacher and other adult helpers during Work Place time.*

Preparation

In today's session, you'll introduce Work Place 3C Round & Add Tenths, which takes the place of Work Place 1D Quotients Win. Before this session, you should review the Work Place Guide, as well as the Work Place Instructions. Make copies of the 3C Round & Add Tenths Record Sheet for use today and store the rest in the Work Place 3C Round & Add Tenths tray.

Problems & Investigations

Decimal Warm-Ups

1 Open the session by playing a brief round of I Have, You Need in which you call out money amounts between 0 and $1.00, and the students respond with the amounts needed to total $1.00.

- Start by calling out addends that are multiples of 5 cents, and then move to any value up to $1.00.
- After calling out numbers that are more challenging (63¢, 49¢, 28¢, 72¢, and so on), have students explain how they figure out the addend needed to make a total of $1.00.

2 After a few minutes, display the Comparing Decimal Numbers Teacher Master.

The problem on this master appeared on the Decimal Color & Order Student Book pages in Unit 3, Module 1, Session 5, so most students will have had a chance to think about it before.

3 Read the problem aloud and ask students to consider whether they agree or disagree. Use their responses to generate a class discussion about equivalencies and comparing decimals.

SUPPORT Have students build both numbers—0.4 and 0.16—with base ten pieces before you discuss how the two compare.

> ***Teacher*** *I'm interested in hearing how you would respond if Jana were in our class and you heard her make this statement. What would you say to her? Is she correct?*
>
> ***Students*** *I think she is correct. Sixteen is bigger than 4.*
>
> *Yeah, but she's not comparing the same things. We are talking about decimals, so 0.4 is four tenths, but 0.16 is sixteen hundredths.*
>
> *Right, if you make those numbers with base ten pieces, tenths are strips, and 0.4 is four of them. Hundredths are the little squares, so even though Jana has 16 of them, they are much smaller.*
>
> ***Teacher*** *I heard you say that 0.16 is sixteen hundredths. What if we wanted to talk about the hundredths in the number 0.4? How many hundredths is that?*
>
> ***Fionna*** *There isn't anything in the hundredths place, but there are 4 tenths and that is the same as 40 hundredths.*
>
> ***Teacher*** *So what do we think about what Jana said?*
>
> ***Students*** *She is wrong because she needs to look at it like decimals and not whole numbers.*
>
> *She can look at the tenths to compare them easier.*
>
> ***Teacher*** *I can tell you are really thinking about the value of these digits. That's what this type of problem takes!*

Math Practices in Action 5.MP.3

Students construct viable arguments and critique the reasoning of others during this discussion. This early in students' exploration of decimal numbers, it is useful to use hypothetical students' work to present common misconceptions. This way, students can address these misconceptions safely and, in so doing, deepen their own understandings of decimal numbers.

Assessment

Decimal Equivalencies Work Sample

4 Next, let students know that they will complete two more decimal problems on their own.

5 Display a copy of the Decimal Equivalencies Work Sample, and tell students you will collect these papers in about 15 minutes and look them over to see how they're doing with reading, writing, and comparing decimal numbers.

- Pass out copies of the Decimal Equivalencies Work Sample.
- Give students a minute to read over the page and ask any questions.
- Have a helper place one or more sets of base ten pieces at each table. Let students know they can use the pieces to help if they like.

6 When they understand what to do, give them about 15 minutes to work.

- Circulate to help students read the questions or provide other support as needed.
- If some students finish before others, have them quietly read at their seats.
- Collect their papers and look them over later.

SUPPORT If some of the students aren't able to complete the work sample during the time allotted, give them additional time within the next day or two to finish their work.

Assessment Guide

See the Grade 5 Assessment Guide for scoring and intervention suggestions.

Work Places

Introducing Work Place 3C Round & Add Tenths

7 Introduce the game Round & Add Tenths.

- Display the 3C Round & Add Tenths Record Sheet where everyone can see.
- Explain that the game will help students round decimals.

8 Briefly summarize the game.

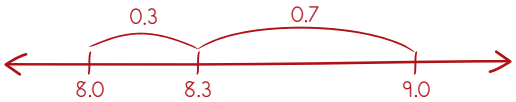
Players roll dice and arrange the two resulting digits to form a number having ones and tenths. Then they round their decimal to the nearest whole number. Players take turns making and rounding numbers until all whole numbers on the record sheet number line are claimed. Players add their numbers, and the player with the greatest sum wins.

9 Play a game of Round & Add Tenths against the class. Use the Work Place Instructions 3C Round & Add Tenths Student Book pages as needed.

> ***Teacher*** *Let's play part of a game together. I will be the first player and use red. You can be the second player and use blue. Ari, will you record for the class, please? The first thing I need to do is roll the two dice. I got a 3 and an 8. Now I need to decide which number I want to put in the ones place and which one I want to put in the tenths place. What are my options?*
>
> ***Nora*** *You can make 8.3 or 3.8.*
>
> ***Teacher*** *I think I will create the number 8.3 so that I have 8 wholes and three tenths. Now, I need to determine which whole number 8.3 rounds to. Can someone help me with that?*
>
> ***Rashad*** *Well, 8.3 comes between 8 and 9. It's closer to 8.*

Teacher *How do you know it's closer to 8?*

Rashad *Because it is 0.3 away from 8, and 0.7 away from 9.*



Teacher *Nice thinking. Now I will use a red colored pencil to write 8.3 in the box below 8.0 because I made a number that rounds to 8. Now it's your turn.*

Nathan *I rolled a 5 and a 3 for us.*

Teacher *Turn and talk with a neighbor about the two choices you have and which you think is a better move. What are your options?*

Students *We can make 5.3 or 3.5.*

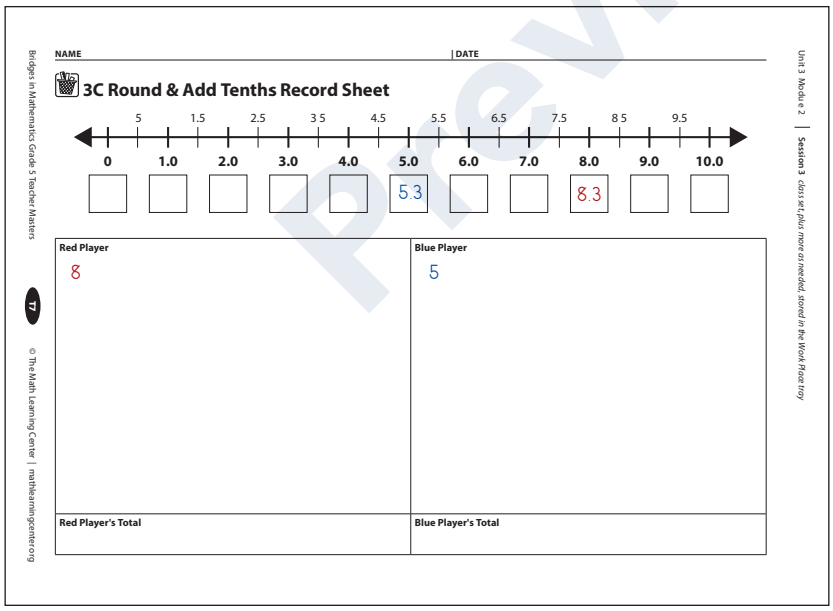
Teacher *Do you know what those numbers round to? Have you decided which play is better?*

Sharman *Well, you said that at the end we are going to add up the numbers we rounded to, so I think we should go for the 5.3 because that rounds to 5 and 3.5 rounds to 4.*

Teacher *Do the rest of you agree? Yes? So, do you think you always want to put the bigger number in the ones place?*

Nathan *I'm not sure. I think so.*

Teacher *Let's play a few more rounds so you can think about that. Nathan, you can use the blue pencil to write 5.3 in the box below the 5.0 since that's what 5.3 rounds to.*



Teacher *My turn again. I rolled a 6 and a 7. I can make 6.7 or 7.6. I think I want to place the 7.6 on the number line.*

Paul *You can't! You have to use 6.7.*

Teacher *Why?*

Paul *7.6 is closer to 8 than it is to 7, and the 8 is already used.*

Teacher *Oh, you're right! I will have to use 6.7, which rounds to 7. What if the 7 were already taken, too? I would have had to skip my turn! Nathan, I will use red to record my number under the 7.0, and then you may roll for the class.*

Nathan *I rolled a 5 and a 4.*

Teacher *What numbers could you make with those digits?*

Students *5.4 or 4.5 Oh no! That's no good.*

Teacher *Whoa, what's not good?*

Students *Well, 5.4 and 4.5 both round to 5.*

Yeah, 5.4 is four-tenths away from 5 and six-tenths away from 6. And 4.5 is right in the middle of 4 and 5 but we know you are supposed to round up. But 5.0 is already taken!

That means we can't mark anything for this round!

Pose questions like the following to promote flexible thinking and strategy development while you play:

- How can you determine which whole number your decimal number rounds to?
- Do you always want to place the higher digit in the ones place? Why or why not?
- Who is winning right now? How do you know?

10 Ask students to turn to a partner to summarize the directions for Round & Add Tenths.

11 Ask students if they have any questions about how to play the game. Then have them get the materials they need to try Round & Add Tenths with a partner.

As students play, circulate to observe, answer questions, and provide differentiated instruction as suggested on the Work Place Guide.

12 Close the session by letting students know they will learn another new Work Place game next session.

Home Connection

13 Introduce and assign the Decimal & Fraction Grids Home Connection, which provides more practice with the following skills:

- Read and write decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Use >, =, and < symbols to record comparisons of two decimals to thousandths (5.NBT.3b)
- Round decimals to the nearest one, tenth, or hundredth (5.NBT.4)
- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value and the relationship between addition and subtraction (5.NBT.7)

Daily Practice

The optional Model, Add & Subtract Decimals Student Book page provides additional opportunities to apply the following skills:

- Write decimals to thousandths with base ten numerals (5.NBT.3a)
- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction (5.NBT.7)

Session 4
Target One

Summary

This session opens with a quick warm-up game of I Have, You Need with decimal combinations of 1, followed by a checkpoint. When students have completed the checkpoint, the teacher introduces Work Place 3D Target One, a game designed to provide practice with decimal place value and adding and subtracting decimal numbers. After a demonstration game, students play again in pairs and spend the remainder of the session visiting Work Places.

Skills & Concepts

- Demonstrate an understanding that in a multi-digit number, each digit represents one-tenth what it represents in the place to its left (5.NBT.1)
- Read and write decimals to thousandths represented with base ten numerals and number names (5.NBT.3a)
- Compare pairs of decimals to thousandths, based on an understanding of what the digit in each place represents; use >, =, and < symbols to record comparisons of two decimals to thousandths (5.NBT.3b)
- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction (5.NBT.7)
- Use written numbers and symbols to represent strategies for computing with decimals to hundredths (5.NBT.7)
- Explain the reasoning behind strategies for computing with decimals to hundredths (5.NBT 7)
- Reason abstractly and quantitatively (5.MP.2)
- Attend to precision (5.MP.6)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations I Have, You Need Decimals		
Assessment Decimal Place Value Checkpoint 1		
TM T8 Decimal Place Value Checkpoint 1	• base ten area pieces	
Work Places Introducing Work Place 3D Target One		
TM T9 Work Place Guide 3D Target One **TM T10** 3D Target One Record Sheet **SB 86*** Work Place Instructions 3D Target One	• Number Cards (1 deck for each student pair)	
Work Places in Use		
2B Racing Fractions (introduced in Unit 2, Module 2, Session 2) **2C** Target Practice (introduced in Unit 2, Module 2, Session 5) **3A** Beat the Calculator: Fractions (introduced in Unit 3, Module 1, Session 2) **3B** Draw & Compare Decimals (introduced in Unit 3, Module 2, Session 2) **3C** Round & Add Tenths (introduced in Unit 3, Module 2, Session 3) **3D** Target One (introduced in this session)		
Daily Practice		
SB 87 Working with Decimals		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master.
** Run 1 copy of this page for use by the teacher and other adult helpers during Work Place time.*

Preparation

- In today's session, you'll introduce Work Place 3D Target One, which takes the place of Work Place 2A Clock Fractions Game. Before this session, you should review the Work Place Guide, as well as the Work Place Instructions. Make copies of the 3D Target One Record Sheet for use today and store the rest in the Work Place 3D Target One tray.
- Write a list of Work Places from which students can choose today. You can just write the numbers (2B–3D) or write out the full names if you prefer. (See the Work Places in Use row of the Materials Chart for the complete list of Work Places in use today.)

Problems & Investigations

I Have, You Need Decimals

1 Open the session by leading the I Have, You Need game with decimal combinations of 1 for a few minutes.

- Before you begin, take a moment to help students connect the idea of decimal combinations of 1 to the combinations of $1.00 that they played in the previous session.

> ***Teacher*** *Today, we are going to play I Have, You Need for a few minutes, making combinations of 1.*
>
> ***Students*** *Combinations of 1? How will we do that?*
>
> *She can say decimals.*
>
> *Oh, that will be hard!*
>
> ***Teacher*** *Will it? We have already played combinations of $1.00. How can you use what you know about money to help with this version?*
>
> ***Student*** *We can think about dimes and pennies as tenths and hundredths.*

- Start the game with addends that are tenths, and then move to hundredths.

> ***Teacher*** *I have 4 tenths.*
>
> ***Students*** *You need 6 tenths.*
>
> ***Teacher*** *I have 72 hundredths.*
>
> ***Students*** *You need 28 hundredths.*

- After calling out numbers that are somewhat challenging (0.54, 0.46, 0.38, 0.82, and so on), have students explain how they figured out the addend they needed.

> ***Teacher*** *Monica, when I said 38 hundredths, you responded with 62 hundredths pretty quickly. Maybe you have a tip to share?*
>
> ***Monica*** *Well, unless I just know the partner for the one you call out, I usually think about how much I need to get to the next ten. Or tenth for these numbers.*
>
> ***Teacher*** *So tell us about this particular problem.*
>
> ***Monica*** *Well, you said 38 hundredths, so I would need 2 more hundredths to get to 40 hundredths. Then I just need 60 more, so that's 62 hundredths.*
>
> ***Teacher*** *Does anyone else have any tips?*
>
> ***Armando*** *I've gotten pretty good at the combinations of 100 since we first started playing, so today I've just been thinking of the numbers you call as whole numbers and adjusting my answer to be decimals.*
>
> ***Teacher*** *Thank you for sharing your thinking. I think you will find that as you get stronger at combinations of 100 and 1, your addition and subtraction strategies will become even more efficient than they already are.*

Assessment

Decimal Place Value Checkpoint 1

2 Display Decimal Place Value Checkpoint 1, and give each student a copy. Give students a minute to look it over, ask questions, and then have them begin.

- Have a helper place one or more sets of base ten pieces at each table. Let students know they can use the pieces to help if they like.
- Encourage students to read each question carefully, and remind them they can ask you for help reading any of the questions.
- Remind students to work quietly by themselves.
- While students work, circulate around the room to make observations and answer questions.
- Give students about 20 minutes or so to do the checkpoint.
- If some students finish earlier than others, ask them to read quietly.

3 Collect students' checkpoints.

SUPPORT Since this is not a timed test, give students who are unable to complete the work more time to finish later in the day or early the next day.

Assessment Guide

See the Grade 5 Assessment Guide for scoring and intervention suggestions.

Work Places

Introducing Work Place 3D Target One

4 Introduce the game Target One.

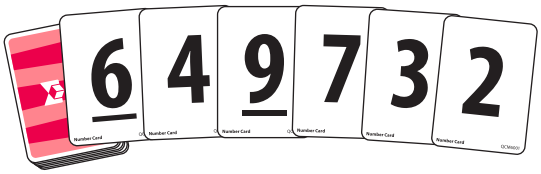
- Display the 3D Target One Record Sheet where everyone can see it.
- Explain that the game will help students understand place value to the hundredths place and let them practice adding and subtracting decimal numbers.

5 Briefly summarize the game before playing against the class.

Each player gets six Number Cards. Players choose four of their cards to make two numbers whose sum is as close to 1 as possible. They add the numbers and write an equation. Their score is the difference between their sum and 1. After five rounds, the player with the lower score wins the game.

6 Play a round of Target One against the class. Use your copy of the Work Place Instructions 3D Target One Student Book page as needed.

Teacher *I'll go first. I have these cards: 6, 4, 9, 7, 3, 2. Does anyone have a suggestion that could help me?*



Students *You should choose the numbers in the tenths place first. The hundredths won't make as much difference.*

Right. Pick two numbers that get close to 1 like 0.6 and 0.3. That would give you 0.9.

Then you can find numbers for the hundredths that get you closer, like 7 and 2.

> ***Teacher*** *Those are really smart strategies. I'll put 6 in one of the tenths places and 3 in the other. Where should I put the 7 and the 2?*
>
> ***Harmony*** *It doesn't really matter. They will still add up to 9 hundredths no matter where they are.*
>
> ***Teacher*** *Take a moment to think about strategies that might help you win this game.*
>
> ***Students*** *You can use what you know about combinations of 10 and 100 to help make numbers that will get close to 1.*
>
> *I'd start with the tenths to get close to 1 and then get closer with the hundredths.*
>
> *You can estimate first to find numbers that add up to close to 1.*

Pose questions like the following to promote flexible thinking and strategy development while you play:

- How will you decide which four cards to choose?
- How should you decide which numbers to put in the tenths place and in the hundredths place?
- What strategies can you use to add decimal numbers?
- What happens if the numbers you add are greater than 1?
- What is an efficient strategy for finding your score?

7 Ask students to turn to a partner to summarize the directions for Target One.

8 Ask students if they have any questions about how to play the game. Then have them get the materials they need to play Target One with a partner.

As students play, circulate to observe, answer questions, and provide differentiated instruction as suggested on the Work Place Guide.

Work Places

9 Invite students to spend any time remaining in the session at Work Places.

Have students pick up their Work Place folders and a pencil and remind them to fill out their Work Place Logs as they finish each activity.

SUPPORT Suggest specific Work Places for struggling students to work on critical skills.

CHALLENGE Encourage students to think about the strategies they are using and share their thinking. Encourage them to generalize what happens in certain Work Places.

10 Close the session.

- Have students put away Work Place materials.
- Have them suggest four cards which would be the best to draw and explain their reasoning.

Daily Practice

The optional Working with Decimals Student Book page provides additional opportunities to apply the following skills:

- Write decimals to thousandths with base ten numerals, number names, and in expanded form (5.NBT.3a)
- Use >, =, and < symbols to record comparisons of two decimals to thousandths (5.NBT.3b)
- Round decimals to the nearest tenth and hundredth (5.NBT.4)

Session 5

Charting Decimal & Fraction Equivalencies

Summary

Today, students work as a whole class and then in small groups to find and record the decimal equivalencies for a variety of common fractions. As they finish, they go to Work Places. At the end of the session, the teacher introduces and assigns the Read, Write & Compare Decimals Home Connection.

Skills & Concepts

- Read decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction (5.NBT.7)
- Use written numbers and symbols to represent strategies for computing with decimals to hundredths (5.NBT.7)
- Explain the reasoning behind strategies for computing with decimals to hundredths (5.NBT 7)
- Reason abstractly and quantitatively (5.MP.2)
- Attend to precision (5.MP.6)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations Charting Fractions & Decimals		
SB 88* Fractions & Decimals Chart **SB 89-90*** Decimal Grid	• base ten area pieces (optional, for challenge suggestion)	• student math journals • calculators, class set • rulers, class set • colored pencils
Work Places in Use		
2B Racing Fractions (introduced in Unit 2, Module 2, Session 2) **2C** Target Practice (introduced in Unit 2, Module 2, Session 5) **3A** Beat the Calculator: Fractions (introduced in Unit 3, Module 1, Session 2) **3B** Draw & Compare Decimals (introduced in Unit 3, Module 2, Session 2) **3C** Round & Add Tenths (introduced in Unit 3, Module 2, Session 3) **3D** Target One (introduced in Unit 3, Module 2, Session 4)		
Home Connection		
HC 49–50 Read, Write & Compare Decimals		
Daily Practice		
SB 91 Fractions, Decimals & Money		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master. ** Run one copy of these pages for display.*

Preparation

Write a list of Work Places from which students can choose today. You can just write the numbers (2B–3D) or write out the full names if you prefer. (See the Work Places in Use row of the Materials Chart for the complete list of Work Places in use today.)

Problems & Investigations

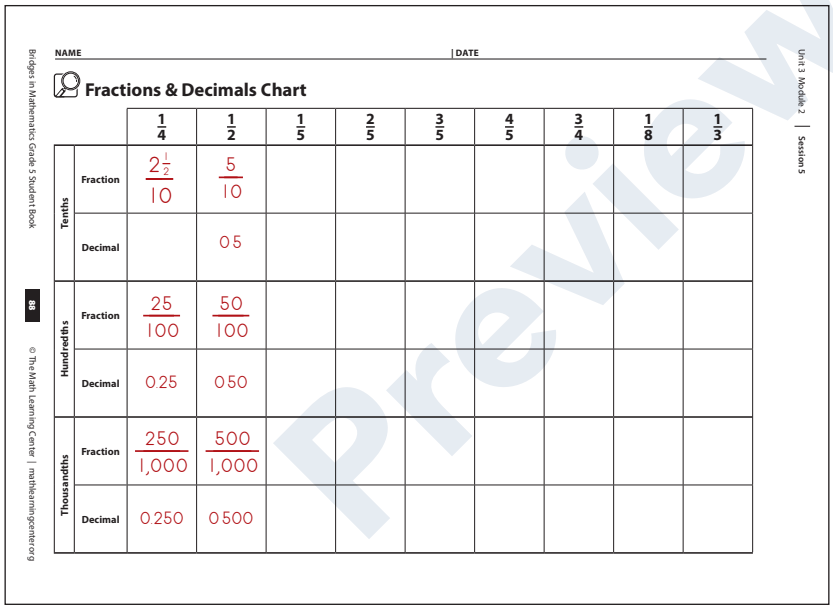
Charting Fractions & Decimals

1 Open the session by letting students know they're going to do some more work with decimals and fractions, first as a whole group, and then in smaller groups. When they finish the small group work, they'll get their folders and go to Work Places.

2 Display your copy of the Fractions & Decimals Chart Student Book page, and have students find the page in their books.

- Give students a minute to study the chart and pair up to share observations.
- Then work with input from the class to fill in the first two columns. As you record the values on the display, have students do the same on their own sheets.

Suggest that students find the journal entry they made several sessions ago, when they outlined ¼ of a decimal grid and wrote as many different decimal and fraction names as they could for ¼. Encourage them to work from those notes, as well as their understandings of the relationship between ¼ and ½ to help you fill in the values for ½ on the chart.



NAME | DATE

Fractions & Decimals Chart

		$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{1}{3}$
Tenths	Fraction	$\frac{2\frac{1}{2}}{10}$	$\frac{5}{10}$							
	Decimal		0.5							
Hundredths	Fraction	$\frac{25}{100}$	$\frac{50}{100}$							
	Decimal	0.25	0.50							
Thousandths	Fraction	$\frac{250}{1,000}$	$\frac{500}{1,000}$							
	Decimal	0.250	0.500							

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Unit 3 Module 2 | Session 5

Complex Fractions

Occasionally it will make sense to express a number as a complex fraction. If necessary, explain to students that the numerator and denominator of a fraction can contain any rational number or expression, including decimals or other fractions, and that they'll find more examples of complex fractions as they continue to develop their math skills.

3 After the values are entered, have students share mathematical observations, first in pairs and then as a whole group.

Here are some questions you might use to spark students' thinking:

- Can you find and describe any patterns in the numbers?
- Why do you suppose ¼ can't be expressed in tenths (unless one uses a complex fraction such as $^{2.5}/_{10}$) while ½ can be? (Students will return to this same question next session, so they do not need to resolve it now.)

> ***Students*** *The numbers get bigger when you go down the columns, like $^{5}/_{10}$, $^{50}/_{100}$, and $^{500}/_{1,000}$.*
>
> *I don't think they actually get bigger. It's just different names for the same thing.*
>
> *But if you look at the fractions, the numbers in both the numerators and the denominators get bigger.*

I think you just keep cutting the same amount, like ½, into smaller and smaller pieces. The smaller the pieces are, the more of them you have.

Teacher *I'm really curious to know what you think about the fact that there's no entry for tenths in the ¼ column.*

Students *If you look at the grid the way I colored it in the last time we had Decimal Grid pages, you can see that ¼ is 2 ½ tenths. There's no way to get it to come out to a whole number of tenths.*

Maybe that's because you can't divide 10 by 4. You can say that ½ is $\frac{5}{10}$ because there are 10 tenths on the grid and 10 ÷ 2 = 5, but it doesn't work out for ¼.

I bet it's because you can divide 100 and 1,000 by 4.

So, is it 2.5 tenths or 2 ½ tenths?

Teacher *Mathematicians don't usually write a final answer either way. They are more likely to write the equivalent in hundredths. How can we write two and a half tenths as a decimal? Let's start by writing 2 tenths. 0.2. Now we need to write ½ of a tenth. That is 0.05, like 5 cents is half of a dime. So two and a half tenths is 0.25.*

4 Next, explain that students will work in groups of four to complete the rest of the chart.

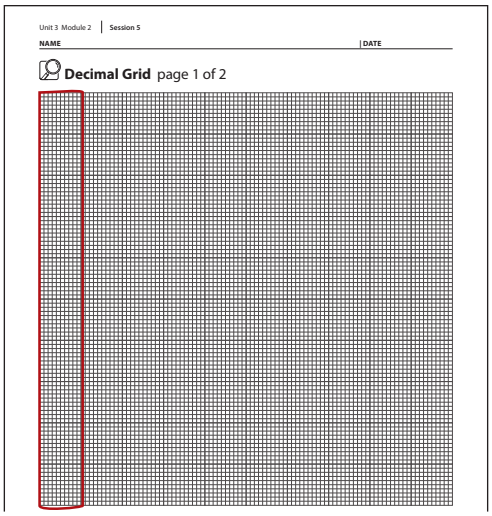
- Tell students that each person in the group will pick one of the next four fractions listed across the top of the chart to investigate: $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, or $\frac{4}{5}$.
- Explain that each group member must choose a different fraction so that each of the four fractions is addressed. (You might assign the students in each group the numbers 1, 2, 3, and 4 by numbering off around the room to avoid potential disagreements about who gets to work with which fraction.)

5 Display a copy of the first Decimal Grid Student Book page and explain the directions.

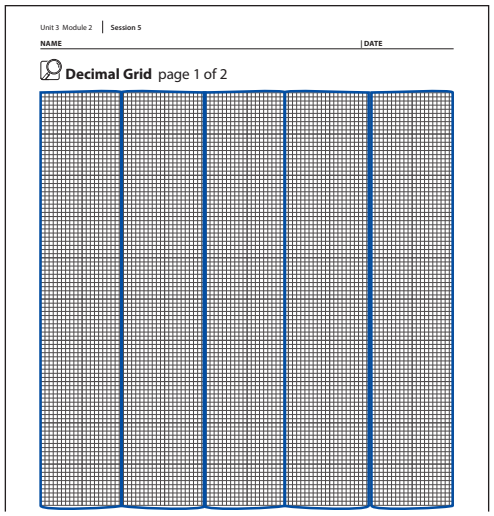
- Tell students they will first outline their fraction on the Decimal Grid. Then they will determine how it can be expressed in tenths, hundredths, and thousandths and list those values on the Fractions & Decimals Chart.
- Tell students that while each person is responsible for one fraction, they should work together to outline the assigned fractions on their Decimal Grids. Suggest they work in pencil before they outline with a crayon.

6 Have students turn to a partner to summarize the directions for this task. Then answer any questions they may have and let them get started.

SUPPORT If necessary, work with student input to identify $\frac{1}{5}$ of the grid on the display copy before students begin. You might ask them to think about it in terms of how the grid can be accurately divided into five equal parts.

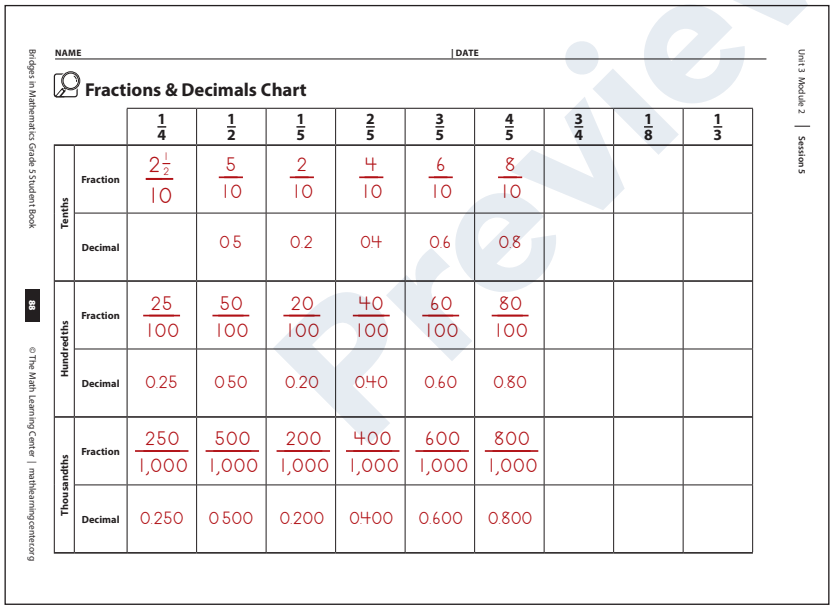


Here's 1/10 of the grid.



On this grid, the tenths have been paired up. Now the grid is divided into 5 equal parts, and each of the parts is 1/5.

7 After students have listed the values for their own fraction on their charts, ask them to exchange information within their group and enter the values for the other three fractions.



NAME | DATE

Fractions & Decimals Chart

		1/4	1/2	1/5	2/5	3/5	4/5	3/4	1/8	1/3
Tenths	Fraction	2½/10	5/10	2/10	4/10	6/10	8/10			
	Decimal		0.5	0.2	0.4	0.6	0.8			
Hundredths	Fraction	25/100	50/100	20/100	40/100	60/100	80/100			
	Decimal	0.25	0.50	0.20	0.40	0.60	0.80			
Thousandths	Fraction	250/1,000	500/1,000	200/1,000	400/1,000	600/1,000	800/1,000			
	Decimal	0.250	0.500	0.200	0.400	0.600	0.800			

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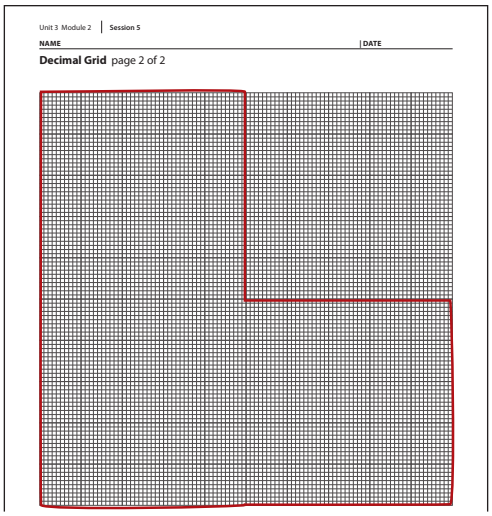
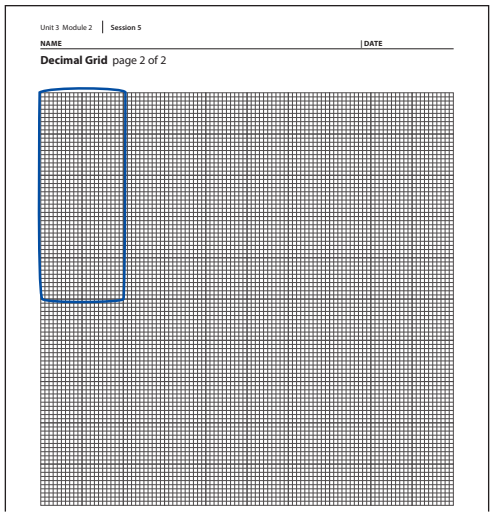
8 As groups finish this part of the assignment, ask them to turn to the second Decimal Grid Student Book page and use it to outline and generate the values for one of the next two fractions on the chart: ¾ or ⅛.

Remind students of the values they got when entering eighths into a calculator as they played Beat the Calculator: Fractions, ⅛ = 0.125.

Students can either support each other by doing one of the two fractions together as a group, or they can each work on the fraction of their choice. While more challenging than any of the fractions they've outlined so far, ¾ and ⅛ are still relatively accessible.

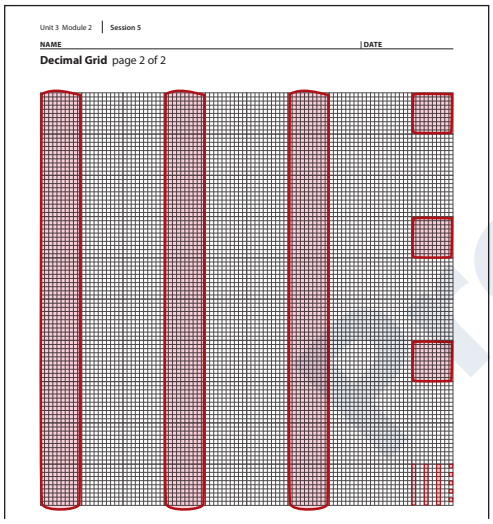


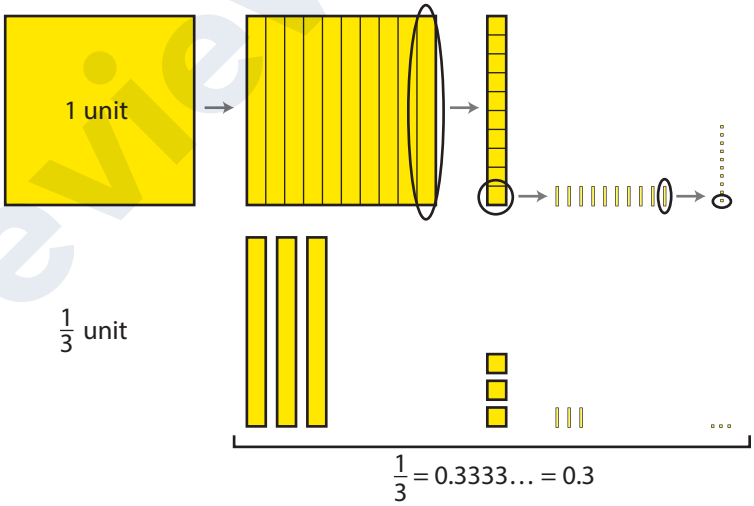
¾ (0.75)



⅛ (0.125)

CHALLENGE Some students might enjoy finding ⅓ on the Decimal Grid. If this proves too difficult, suggest they try using the base ten pieces to help. Examples of possible solutions are shown below, but it is perfectly fine if no one in your class chooses to take on the challenge. When students use their calculators in the upcoming session, they'll discover that 1 ÷ 3 produces results different than the other fractions on the chart.





Student *⅓ is weird. We keep winding up with one piece left over to divide into thirds. It just goes on and on, no matter how tiny the pieces get.*

Work Places

9 As the students in each group finish filling out the chart for ¾ or ⅛ (and possibly ⅓ as well), invite them to spend any time remaining at Work Places.

10 Close the session.

Let students know that you'll return to the Fraction & Decimals Chart as a group next session.

Home Connection

11 Introduce and assign the Read, Write & Compare Decimals Home Connection, which provides more practice with the following skills:

- Write decimals to thousandths with base ten numerals, with number names, and in expanded form (5.NBT.3a)
- Compare pairs of decimals to thousandths (5.NBT.3b)
- Add and multiply decimals to hundredths, using strategies based on place value (5.NBT.7)

Daily Practice

The optional Fractions, Decimals & Money Student Book page provides additional opportunities to apply the following skills:

- Read and write decimals to hundredths represented with base ten numerals (5.NBT.3a)

Session 6

Fraction & Decimal Equivalencies

Summary

The session begins with a decimal subtraction string that highlights the constant difference strategy. Then students discuss and complete the Fractions & Decimals Chart they started in the previous session. Students spend the remaining time visiting Work Places.

Skills & Concepts

- Read and write decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Subtract decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)
- Construct viable arguments and critique the reasoning of others (5.MP.3)
- Look for and express regularity in repeated reasoning (5.MP.8)

Materials

Copies	Kit Materials	Classroom Materials
Problem String Constant Difference		
		• student math journals
Problems & Investigations Fractions & Decimals Chart		
		• Fractions & Decimals Chart and Decimal Grid Student Book pages (SB 88–90, completed in Session 5) • calculators, class set
Work Places in Use		
2B Racing Fractions (introduced in Unit 2, Module 2, Session 2) **2C** Target Practice (introduced in Unit 2, Module 2, Session 5) **3A** Beat the Calculator: Fractions (introduced in Unit 3, Module 1, Session 3) **3B** Draw & Compare Decimals (introduced in Unit 3, Module 2, Session 1) **3C** Round & Add Tenths (introduced in Unit 3, Module 2, Session 3) **3D** Target One (introduced in Unit 3, Module 2, Session 4)		
Daily Practice		
SB 92 Decimal Practice		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master.

Problem String

Constant Difference

1 Open the session by telling students they will begin with a subtraction problem string and then continue their work with the Fractions and Decimals Chart from last session.

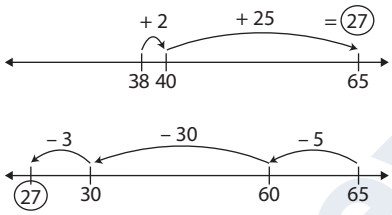
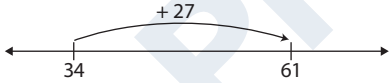
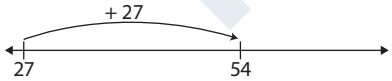
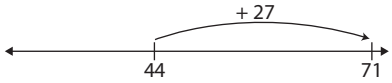
2 Have them date and label the next available math journal page for today's problem string.

For each problem, do the following:

- Present the problem.
- Allow students time to solve the problem and model their thinking in their journals.
- Ask students to share their thinking and model strategies on the board with a number line.

3 Begin the string with the first problem. Solicit explanations both from students who removed and from those who found the distance between the two numbers. Model each strategy on a number line.

Problem String Constant Difference, Part 1

Problems	Sample Strategies & Recording	Connections
65 – 38		This particular combination does not lend itself to either removal or differencing because the subtrahend is neither very close nor very far from the minuend. It can reasonably be solved either way.
In posing the next three problems, solicit responses from students who used a differencing strategy and model their thinking on number lines.		
61 – 34		**Big Idea** Here, you can see the idea of constant difference in action. In each of these problems, the minuend and the subtrahend have been decreased or increased, both by the same amount. This has the effect of keeping the difference, or distance, between them (27 in this case) the same.
54 – 27		
71 – 44		

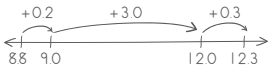
4 Before you continue with the string, take a minute to note with students that the answer has been the same for all four problems so far, and discuss why this is the case.

> ***Teacher*** *We have solved four problems so far and I know some of you are really anxious to mention what you have noticed is happening. What's going on with these problems?*
>
> ***Students*** *All of the answers are 27!*
>
> *The numbers are all the same distance apart on the number line. They just start and end at different places.*
>
> *Oh, yeah. All the problems are sort of the same—the space between the numbers is the same.*

Constant Difference

The problem strings offered this session and next feature the constant difference strategy, which involves creating an equivalent problem that is easier to solve by shifting each of the numbers by the same amount. Students will discover that this strategy is most effective when the subtrahend can be shifted to a "nice number" (i.e., a whole number or a multiple of 10, 100, 1,000, and so on).

The open number line again serves as a particularly effective way to model and solve problems using the constant differences strategy. Consider the problem 12.3 – 8.8, which can be solved by finding the difference or distance between the subtrahend and the minuend, as shown here.



0.2 + 3.0 + 0.3 = 3.5
so 12.3 – 8.8 = 3.5

The combination becomes even easier to solve if we shift the 8.8 up the line by 2 tenths to become 9.0. We have to make the same shift for 12.3 so the difference between the subtrahend and the minuend will remain constant. The resulting combination, 12.5 – 9.0 is very easy to compute mentally; much more so than 12.3 – 8.8.

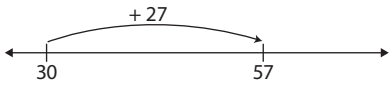
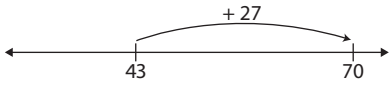
$$\begin{array}{r} 12.3 \\ +\ 0.2 \\ \hline 12.5 \end{array} \qquad \begin{array}{r} 8.8 \\ +\ 0.2 \\ \hline 9.0 \end{array} \quad 12.5 - 9.0 = 3.5$$

Teacher *You are correct. It's almost like there is a bubble, or distance, of 27 that is sliding up and down the number line. The size of the distance stays the same, 27, but it's moving up and down the number line so it has different starting and ending points. I wonder why or when that might be useful? Let me give you another problem.*

5 Pose two more problems.

- Help students connect both to the 4 previous problems.
- Ask them which of the 6 combinations in the string was easiest to solve and why.

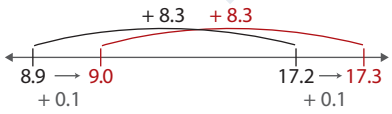
Problem String Constant Difference, Part 2

Problems	Sample Strategies & Recording	Connections
57 – 30		**Big Idea** Students will likely agree that 57 – 30 is the easiest in the set because it's so easy to solve mentally. The larger point to make with the class is that in using the constant difference strategy, it's optimal to change the second number—the subtrahend—to a multiple of 1, 10, 100, 1,000, etc.
70 – 43		

6 Pose a final problem, and challenge students to use the constant difference strategy in the context of decimal numbers.

- Ask them if they can see a way to make the problem any easier by adding or subtracting the same number to or from the minuend and the subtrahend in order to change one of them, preferably the subtrahend into a friendly (whole) number.
- Record their thinking with equations as well as on the open number line, as both serve to make the constant difference strategy visible.

Problem String Constant Difference, Part 3

Problems	Sample Strategies & Recording	Connections
17.2 – 8.9	 17.2 + 0.1 = 17.3 – 8.9 + 0.1 = 9.0 8.3	Some students may suggest subtracting two-tenths from both numbers to produce 17.0 – 8.7. If this happens, press to see if they can find a way to shift both numbers in such a way that the subtrahend becomes friendly. If necessary, guide students to shifting both numbers up by one-tenth to produce the combination 17.3 – 9.0, which can be solved mentally. Students might also suggest adding 1.1 to both the minuend and the subtrahend to produce 18.3 – 10.0, also very easy to solve.

Problems & Investigations

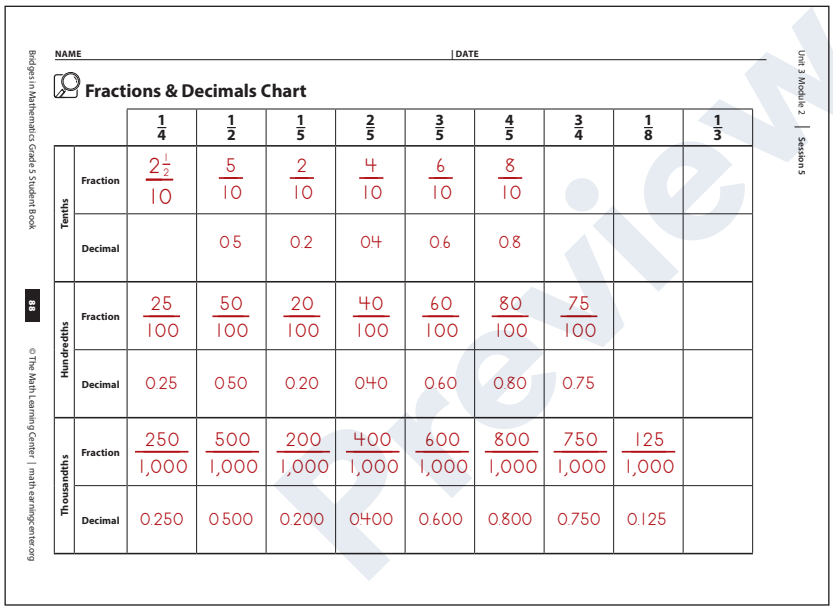
Fractions & Decimals Chart

7 After the problem string, display your copy of the Fractions & Decimals Chart Student Book page from the previous session as students find their own charts in their Student Books.

Make sure all the groups have entered values on their own charts for 1/5, 2/5, 3/5, and 4/5 and that some have found values for 3/4, 1/8, and possibly 1/3. If students need a few more minutes to work, give them some time now.

CHALLENGE Encourage students to make sense of the cells with an asterisk (*) in them. The proportional reasoning involved is challenging, but students can find the values by reasoning about place value.

8 Work with student input to fill in the display copy of the Fractions & Decimals Chart. Have students add any information they may be missing to their own charts.



NAME | DATE

Fractions & Decimals Chart

		1/4	1/2	1/5	2/5	3/5	4/5	3/4	1/8	1/3
Tenths	Fraction	2 1/2 / 10	5/10	2/10	4/10	6/10	8/10			
	Decimal		0.5	0.2	0.4	0.6	0.8			
Hundredths	Fraction	25/100	50/100	20/100	40/100	60/100	80/100	75/100		
	Decimal	0.25	0.50	0.20	0.40	0.60	0.80	0.75		
Thousandths	Fraction	250/1,000	500/1,000	200/1,000	400/1,000	600/1,000	800/1,000	750/1,000	125/1,000	
	Decimal	0.250	0.500	0.200	0.400	0.600	0.800	0.750	0.125	

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9 Next, have students share mathematical observations, first in pairs and then as a whole class.

Here are some questions you might use to spark students' thinking:

- Can you find and describe any patterns in the numbers?
- How might students account for the fact that some of the boxes on the chart haven't been filled?

> ***Students*** *The decimals for the fifths, like 1/5 and 2/5 go by 2s, like 2, 4, 6, 8.*
>
> *But it's not really 2s. It's 2 tenths, 4 tenths, 6 tenths, like that.*
>
> *We noticed that if you look at the decimals for 1/4, 1/2, and 3/4 they go together. See how in the hundredths row, it goes 0.25, 0.50, and then 0.75.*
>
> *That makes sense because it's like you're adding another fourth each time with those three fractions, and there are 25/100 in a fourth. It's kind of like counting by 25s.*
>
> ***Teacher*** *I'd like some of you to comment about the empty boxes on our chart. What do you notice about what's missing?*

Math Practices in Action 5.MP.8

When you invite students to look for patterns among the fractions and their decimal equivalents, you give them the opportunity to look for and express regularity in repeated reasoning. This exercise helps students draw connections between fractions and decimals and develop a solid understanding of how place value works in decimal numbers.

Students *We tried to find decimals for ⅓, but we kept getting remainders, just like when we tried to divide $100 by 3 the other day. The only way you could fill those boxes is if you wrote something like* $\frac{3\ \frac{1}{3}}{10}$ *or* $\frac{33\ \frac{1}{3}}{100}$.

I think it has to do with what divides by what. You can divide 10 evenly by 2 and 5, but you can't divide 10 evenly by 4, 8, or 3.

You can't divide 100 evenly by 8, so maybe that's why you can't show hundredths for ⅛.

Teacher *Can you divide 1,000 by 8?*

Nia *Yes! It's 125, so you can say that ⅛ is the same as 125 thousandths.*

Teacher *What is 100 divided by 8?*

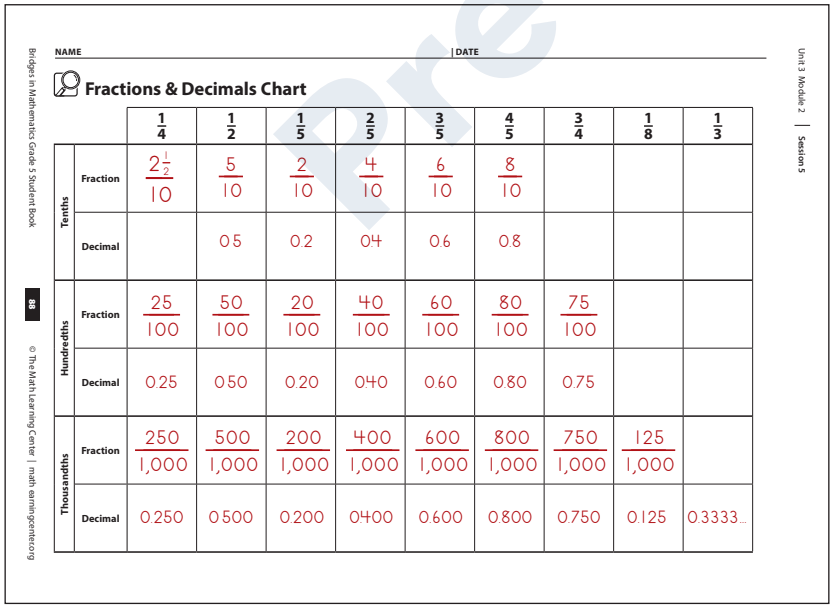
Cameron *It is 12.5. So, then you can also write 0.125 for hundredths. It's kind of like 12 and a half hundredths.*

10 Conclude this part of the session by asking students to enter each fraction as a division problem on their calculators.

- Remind them that the fraction ¼ actually *means* 1 ÷ 4.
- Have them enter 1 ÷ 4 on their calculators and report the number that results in terms of hundredths (25 hundredths).
- If necessary, have students correct numbers they've entered on their charts.

11 Next, ask students to reflect on the connection between the answers they obtained on the calculator and the work they did on the decimal grids.

- Why does 1 ÷ 2 on the calculator produce the same results as finding the number of tenths in ½ on the decimal grid?
- What do you think about the fact that the calculator shows some of the answers in tenths, others in hundredths, one in thousandths, and one as a decimal that just keeps going?



NAME | DATE

Fractions & Decimals Chart

		$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{1}{3}$
Tenths	Fraction	$\frac{2\frac{1}{2}}{10}$	$\frac{5}{10}$	$\frac{2}{10}$	$\frac{4}{10}$	$\frac{6}{10}$	$\frac{8}{10}$			
	Decimal		0.5	0.2	0.4	0.6	0.8			
Hundredths	Fraction	$\frac{25}{100}$	$\frac{50}{100}$	$\frac{20}{100}$	$\frac{40}{100}$	$\frac{60}{100}$	$\frac{80}{100}$	$\frac{75}{100}$		
	Decimal	0.25	0.50	0.20	0.40	0.60	0.80	0.75		
Thousandths	Fraction	$\frac{250}{1,000}$	$\frac{500}{1,000}$	$\frac{200}{1,000}$	$\frac{400}{1,000}$	$\frac{600}{1,000}$	$\frac{800}{1,000}$	$\frac{750}{1,000}$	$\frac{125}{1,000}$	
	Decimal	0.250	0.500	0.200	0.400	0.600	0.800	0.750	0.125	0.3333...

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Unit 3 Module 2 | Session 5

Jamal *I think the answers came out the same on the grid and the calculator because it's kind of the same thing. Like when we found the different decimals for ½ on the grid, it was like we were dividing 1 thing into 2 parts and then looking at how many tenths, hundredths, and thousandths there were in one of the parts. We were dividing 1 by 2.*

Natasha *I think the calculator just does the easiest thing. Like with the half and all the fifths, you can see how many tenths there are. The calculator just stops at the first thing you can see.*

Erica *I agree. I think the calculator just keeps running on and on with ⅓ because that's what really happens on the grid. There keeps being a remainder no matter how many times you divide it.*

Work Places

12 Invite students to spend any time remaining in the session at Work Places.

Have students pick up their Work Place folders and a pencil and remind them to fill out their Work Place Logs as they finish each game or activity.

SUPPORT Suggest specific Work Places for struggling students to work on critical skills.

CHALLENGE Encourage students to think about the strategies they are using and share their thinking. Encourage students to generalize what happens in certain Work Places.

13 If you have time, close the session with a few I Have, You Need challenges. Then recognize students for their efforts in today's session and have them clean up and put away materials.

- I have 0.27. (You need 0.73.)
- I have 0.78. (You need 0.22.)
- I have 0.54. (You need 0.46.)
- I have 0.41. (You need 0.59.)

Daily Practice

The optional Decimal Practice Student Book page provides additional opportunities to apply the following skills:

- Write decimals to thousandths with base ten numerals and number names (5.NBT.3a)
- Compare pairs of decimals to thousandths (5.NBT.3b)
- Add decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)

Session 7

Decimals on a Number Line

Summary

This session starts with a decimal subtraction string designed to reinforce the constant difference strategy. Then students use a measuring tape marked in centimeters and millimeters to think about ordering and rounding decimals, and complete a related assignment in their Student Books. At the end of the session, the teacher introduces and assigns the More Decimal Practice Home Connection.

Skills & Concepts

- Read and write decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Compare decimals to thousandths, based on an understanding of what the digit in each place represents (5.NBT.3b)
- Round decimals to the nearest hundredth (5.NBT.4)
- Subtract decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)
- Convert among different-sized standard measurement units within a given measurement system (5.MD.1)
- Make sense of problems and persevere in solving them (5.MP.1)
- Model with mathematics (5.MP.4)

Materials

Copies	Kit Materials	Classroom Materials
Problem String More Constant Difference		
TM T11 Number Line Fractions **TM T12** Ten Millimeters in a Centimeter **SB 93*** Decimals on a Number Line	• measuring tape marked in millimeters (see Preparation) • base ten linear pieces, class set	• cafeteria tray or box lid (see Preparation) • 1′ × 4′ piece of light-colored butcher paper (see Preparation) • clear tape (see Preparation) • 3–4 calculators • glue stick
Problems & Investigations Decimals on a Number Line		
		• student math journals
Home Connection		
HC 51–52 More Decimal Practice		
Daily Practice		
SB 94 Round, Add & Subtract Decimals		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master. ** Run 1 copy of this page for display.*

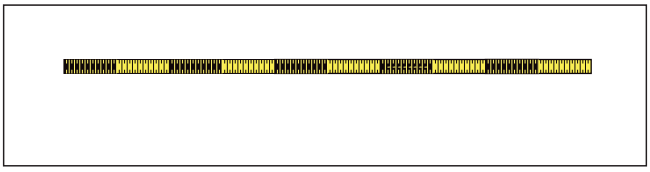
Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

centimeter (cm)*
decimeter
meter (m)*
millimeter (mm)*

Preparation

- Fold a measuring tape back on itself at the 100 cm mark and use clear tape to hold the folded portion out of the way. Then attach the butcher paper strip to your wall where students can see it during the session. Fasten the measuring tape securely to the middle of the butcher paper, as shown here.



- Cut apart your copy of the Number Line Fractions Teacher Master to create 16 small fraction labels. Lay these out on a tray so you can see each of them clearly.

Problem String

More Constant Difference

1 Open the session by telling students they will participate in another subtraction string and then do some work ordering and rounding decimals.

2 Have students date and label the next available math journal page for today's problem string.

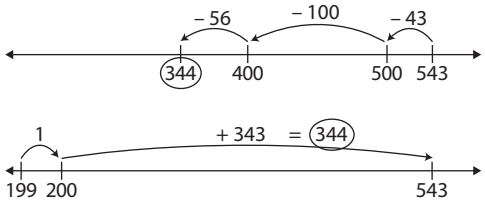
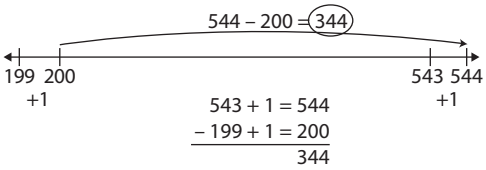
The purpose of today's problem string is to practice using the constant difference strategy, in which students adjust decimal numbers to make problems easier to solve. The string begins with pairs of problems where the second problem suggests an equivalent problem that is easier to solve. The last three problems are given without helper problems.

3 Deliver each problem in the string one at a time by writing it on the board.

- Allow students time to solve the problem and model their thinking in their journals.
- Ask students to share their thinking. Model their strategies on the board with a number line and with equations as well, starting with the second problem in the first pair.

The first 6 problems are presented in pairs. In each case, encourage students to use the results of the first problem to help solve the second.

Problem String More Constant Difference, Part 1

Problems	Sample Strategies & Recording	Connections
543 – 199	Solicit explanations from students who used either a removal strategy or a difference strategy. Model both on number lines.  	Note with the class that the second problem reflects the use of a constant difference strategy because 1 has been added to both the minuend and the subtrahend to produce an easier combination. Make this visible by modeling a difference strategy on the same number line you used for the first combination, and reinforce the idea by writing equations to show that 1 has been added to both numbers.
544 – 200	 	

Extended Introduction

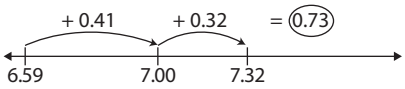
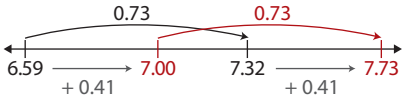
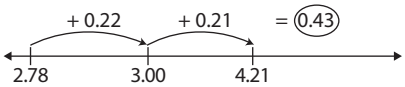
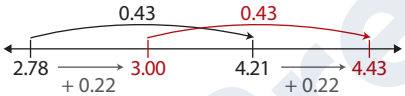
The decimal grid students used in the previous sessions is one way to find decimal and fraction equivalencies. A meter-long measuring tape is a linear model that facilitates investigations of these equivalencies. If the meter is regarded as one unit, the markings for millimeters, centimeters, and decimeters make it possible to see thousandths, hundredths, and tenths of a meter. If you find the halfway point along the tape, it becomes evident that ½ is equivalent to 50 centimeters, which is five tenths of a meter, or fifty hundredths of a meter, or five hundred thousandths of a meter. If you divide the tape into fourths, ¼ falls at 25 centimeters or 0.25 and ¾ falls at 75 centimeters or 0.75. Today, the class constructs a meter-long number line on a large strip of butcher paper. In addition to providing more practice with fraction and decimal equivalencies, the completed number line gives students an accurate picture of how various common fractions compare to one another.

4 Pose the next four problems, one at a time.

When you pose the second problem in each pair, talk with students about how it relates to the first, and how the first could be changed to produce the second, using questions such as the following:

- How can you change 7.32 – 6.59 to get 7.73 – 7? What happens to each number?
- Why change 6.59 to 7? Why not change 7.32 to 7? Or change 7.32 to 8?
- Does the game I Have, You Need help you? How? (Shifting 6.59 to 7 requires that one be able to quickly identify the addend needed to bring 0.59 up to 1.00.)

Problem String More Constant Difference, Part 2

Problems	Sample Strategies & Recording	Connections
7.32 – 6.59		Look now for students using a differencing strategy to solve the first combination in each pair, and model their thinking on a number line. **Big Idea** Use a number line and equations to reinforce the fact that the constant difference strategy requires adding or subtracting the same amount to or from both the minuend and the subtrahend.
7.73 – 7.00	Ask students to think about how they could change the previous problem to help solve this one.  7.32 + 0.41 = 7.73 – 6.59 + 0.41 = 7.00 0.73	
4.21 – 2.78		
4.43 – 3.00	Ask students to think about how they could change the previous problem to help solve this one.  4.21 + 0.22 = 4.43 – 2.78 + 0.22 = 3.00 0.43	

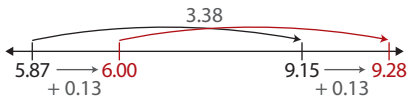
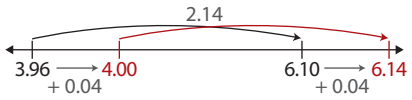
5 Pose the last two problems in the string, neither of which is preceded by a helper combination.

- Encourage students to use the constant difference strategy if they can, or scaffold their thinking a bit to guide them in that direction.
- Choose students to share who are on the verge of understanding the strategy and work to solidify their thinking as they explain.

> ***Students*** *We can make the problems easier, if we add the same thing to both numbers.*
>
> *You add to subtract!*
>
> *We could subtract the same thing from both numbers, too.*
>
> *It's nice when the second number is friendly. Then the subtraction is really easy because of all the zeros.*
>
> ***Teacher*** *When you add or subtract the same thing to both numbers, what does that do on the number line?*
>
> ***Zoey*** *The distance moves up or down, so you get the same distance but in a place where it's easier to figure out.*

- Model students' explanations on the number line and with equations.

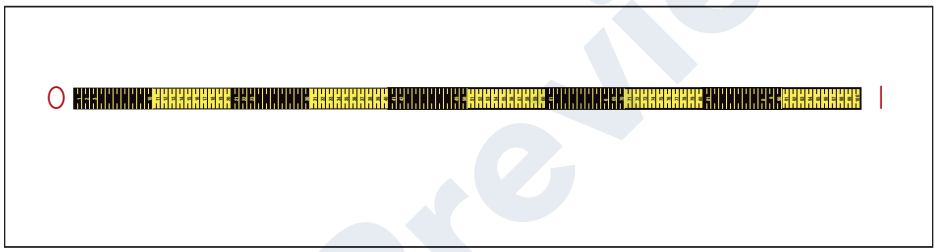
Problem String More Constant Difference, Part 3

Problems	Sample Strategies & Recording	Connections
9.15 – 5.87	 9.15 + 0.13 = 9.28 – 5.87 + 0.13 = 6.00 3.28	Big Idea Look at the second number in the combination—the subtrahend—to see how it might be changed to the nearest whole number. Add or subtract the same amount to or from the minuend to produce an easier combination while keeping the difference, or distance, between the two constant.
6.1 – 3.96	 6.10 + 0.04 = 6.14 – 3.96 + 0.04 = 4.00 2.14	

Problems & Investigations

Decimals on a Number Line

6 Next, draw students' attention to the meter line you created. As they watch, label one end of the line *0* and the other *1*. Explain that this is a meter, and it will serve as your unit for right now.

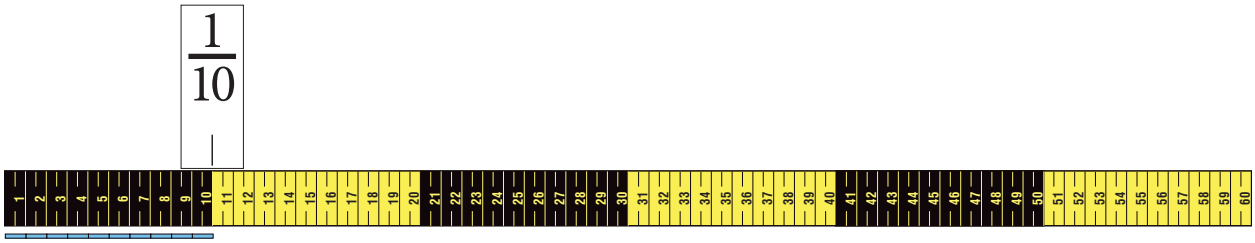


7 Begin today's number line activity by having students consider one-tenth.

- Ask students to turn to a partner and estimate how many base ten linear strips laid end-to-end would equal the meter. Then ask a few volunteers to share their ideas with the class.
- Invite a student to bring up a linear strip, hold one end of it up to the left-hand end of the tape, and make a mark on the butcher paper directly below the measuring tape to show where the other end falls. (10 cm mark)
- Ask students: If the meter is one unit, what part of a meter does the blue base ten linear piece represent?

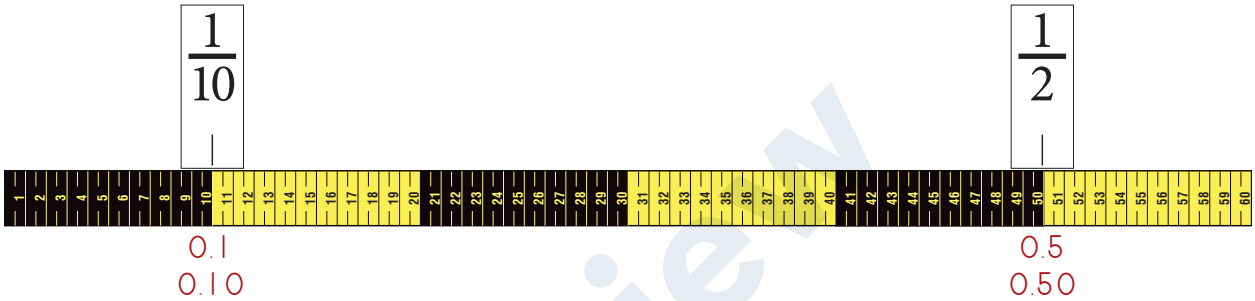
> ***Students*** *It's 1/10 of a meter because it takes 10 of them to make a meter.*
>
> *We don't know for sure that it'll really take 10 of them, even though it looks like it.*
>
> *We just saw that one piece came right to the 10 cm mark. There are 100 centimeters in a meter, so the blue piece must be 1/10 of a meter.*

- When students have agreed that a blue base ten linear piece is 1/10 of a meter—a decimeter—glue the 1/10 label above the 10 cm mark on the butcher paper above the tape measure.
- Then work with student input to write two decimal numbers below the tape measure: 0.1 and 0.10.



8 Next, have students consider one-half.

- Invite a student to come up and make a mark on the butcher paper exactly halfway between the two ends of the tape measure. Have the student explain his thinking as he works.
- Glue the ½ label to the butcher paper above the tape measure and ask students to name the decimal equivalents as you write them below the tape.
- Ask students why the tape says 50 at the halfway point when the decimals you're recording are 0.5 and 0.50.

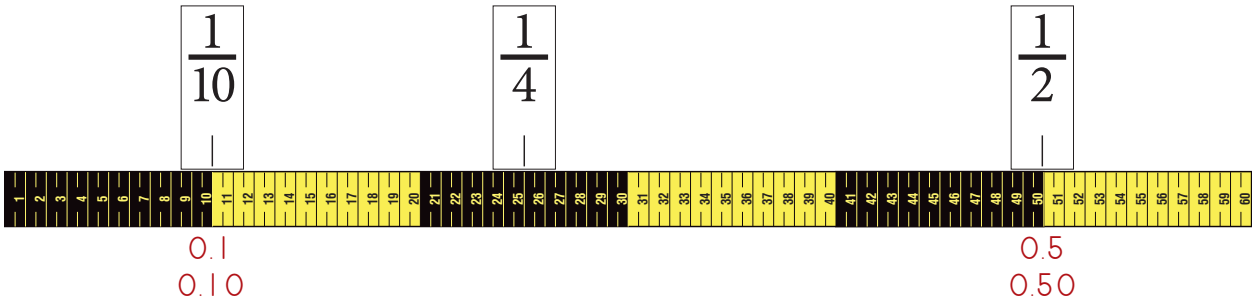


Students *I think it says 50 because the tape is 100 centimeters long so the numbers on it say 10, 20, 30, etc. But if you say the whole thing is worth 1, then ½ is ⁵⁰⁄₁₀₀ instead of just 50.*

Look—the numbers on the tape match the decimals, except they don't have decimal points!

9 Finally, hand the ¼ label to one of your students and ask her to show where she thinks it belongs along the line. As she places the label, have her explain her thinking to the class.

Gloria *I know ¼ is exactly halfway between 0 and ½. I also know that there are 100 centimeters on the tape measure and one-fourth of 100 is 25. If I put this label right where it says 25 on the line, it comes out perfectly.*



10 Work with student input to write a decimal below the ¼ label.

Talk with students about the fact that because there are 100 centimeters in a meter, each centimeter is worth 1/100 of a meter. One-fourth of the meter, or 25 centimeters, is literally 25 hundredths of a meter and is written as 0.25.

CHALLENGE If students are working comfortably with these ideas, you might have them take out their rulers and look to see how the centimeters are each divided into 10 smaller parts. Remind them that these are called millimeters, and ask them to figure out how many there would be in an entire meter (1,000).

11 Explain that you have more fraction labels that need to be glued to the number line. Students will work on a related assignment, and as they work you will call up pairs to choose a fraction to glue and write its decimal equivalents.

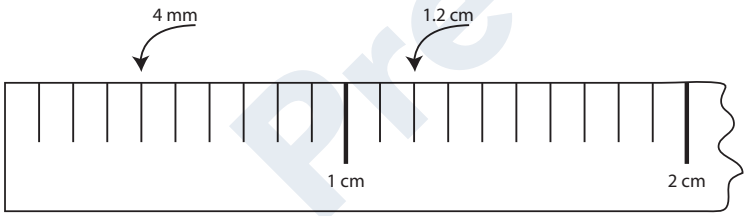
Assure students that they can use calculators if needed when it's their turn to place a fraction on the line.

SUPPORT If you feel it is not appropriate to use all of the fractions, you can eliminate some from the collection. You might also decide to share the convention of labeling nonterminating decimals, such as 0.333 … and 0.1666 … with a bar above the repeating digit to save some space on the number line.

12 Display the Ten Millimeters in a Centimeter Teacher Master, and ask students to study the picture of the ruler that shows the millimeters within 2 centimeters.

Ask the following questions:

- How many millimeters are in a centimeter? (10)
- How many millimeters are in 2 centimeters (20)
- How many centimeters are in a meter? (100)
- How many millimeters are in a meter? (1 000) How do you know?



The marks are 1 millimeter, or $\frac{1}{1000}$ of a meter, apart.

13 Remind students that the prefix "milli" means thousandth. Explain that since there are 1,000 millimeters in a meter, then 1 millimeter is one thousandth of a meter. Write 1/1,000.

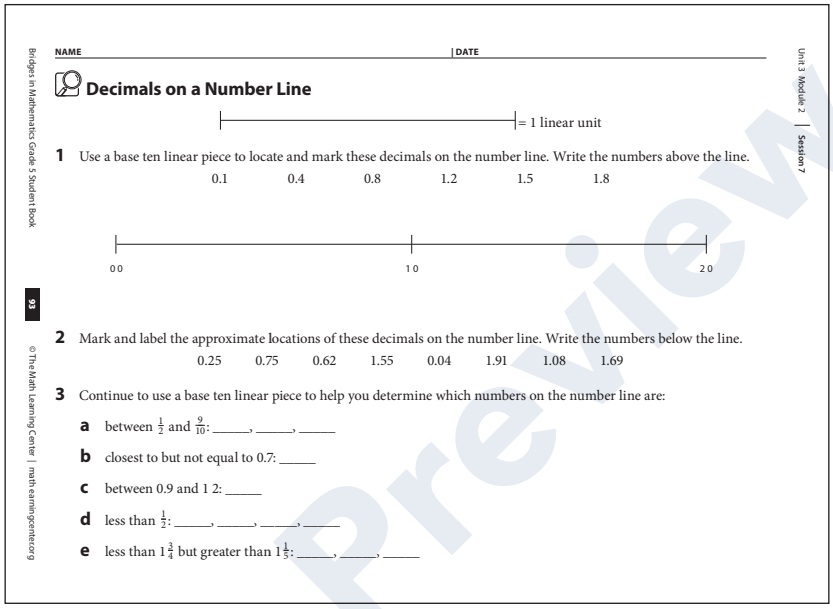
SUPPORT Connect this thinking to the Great Wall of Base Ten and compare the corresponding lengths and pieces.

CHALLENGE Try the following questions:

- How many millimeters are in 8 meters? (8,000)
- How many millimeters are in 25 meters? (25,000)
- How many millimeters are in 6.15 meters? (6,150)

14 Now ask students to turn to the Decimals on a Number Line Student Book page as you display your copy.

- Explain that on this page, the scale has shifted. The blue base ten linear piece is now one unit. Therefore, students can use the markings on the linear piece to find the decimal numbers between 0 and 1 and 1 and 2.
- Review the instructions with students. Use your copy and a blue linear piece to model the process of locating, marking, and labeling the first decimal or two.
  - » Line up a blue base ten linear piece between the 0.0 and 1.0. Ask students how the linear piece can help them find where 0.4 and 0.7 would be.
  - » Then slide the linear piece over so it is between 1.0 and 2.0 and ask students how to find 1.3.
- Once students understand what to do, have them complete the sheet independently and then compare their results with one or more partners.
- As students work, call up pairs to place a fraction and write its decimal equivalents on the meter number line.



NAME _____ | DATE _____

Decimals on a Number Line

= 1 linear unit

1 Use a base ten linear piece to locate and mark these decimals on the number line. Write the numbers above the line.

0.1 0.4 0.8 1.2 1.5 1.8

0.0 1.0 2.0

2 Mark and label the approximate locations of these decimals on the number line. Write the numbers below the line.

0.25 0.75 0.62 1.55 0.04 1.91 1.08 1.69

3 Continue to use a base ten linear piece to help you determine which numbers on the number line are:

a between $\frac{1}{2}$ and $\frac{9}{10}$: _____, _____, _____

b closest to but not equal to 0.7: _____

c between 0.9 and 1.2: _____

d less than $\frac{1}{2}$: _____, _____, _____, _____

e less than $1\frac{3}{4}$ but greater than $1\frac{1}{5}$: _____, _____, _____

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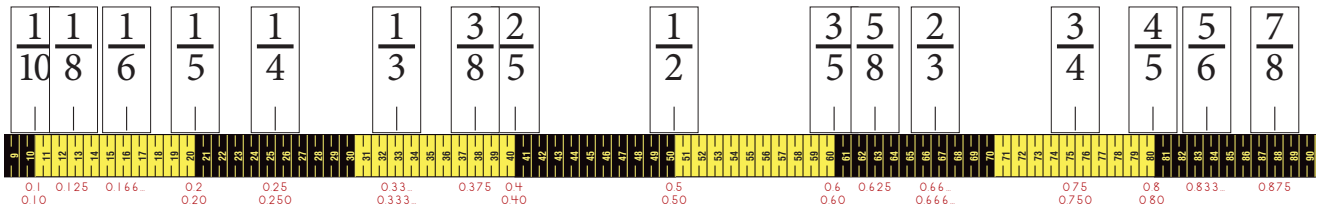
Unit 3 Module 2 | Session 7

CHALLENGE If some students finish quickly, have them create labels for fractions that aren't currently in the collection and add them and their matching decimals to the number line. They can also create and label a decimal number line in their journals that spans two larger numbers such as 74 and 76. It could include decimal numbers such as 74.5, 75.5, 74.25, and so on.

15 When about ten minutes remain in the session, draw students' attention back to the meter number line.

It is all right if the number line is not completed. If it is finished, it will look something like this.



16 Remind students of their work with rounding tenths to the nearest whole number in Session 3. Then review how the meter number line can help them round hundredths to the nearest tenth.

SUPPORT If students are challenged by this thinking, write the number 0.46. Ask students where 0.46 would go on the number line. Then, ask them if it is closer to 0.4 or 0.5.

> ***Anna*** *Number lines make rounding easier whether it is with whole numbers or not. I think you could just find the number in the hundredths place and then look to see which tenth it is closer to.*
>
> ***Teacher*** *Can you give us an example?*
>
> ***Anna*** *Let's say I had to round 0.57 to the nearest tenth. I know that 0.57 is between 0.5 and 0.6 because 0.5 is the same as 0.50 and 0.6 is the same as 0.60. 0.57 is closer to 0.6, so it rounds to 0.6.*

17 Write the numbers 0.08, 0.71, and 0.55 and have students turn to a partner to round each number to the nearest tenth and the nearest 1.

Provide support as needed.

18 Close the session.

- Let students know that the meter number line will stay up for the next few days for reference.
- Have them clean up and put away materials.
- If you have time, give them a few more numbers to round to the nearest tenth.

0.35	2.77	15.11	20.03

Home Connection

19 Introduce and assign the More Decimal Practice Home Connection, which provides more practice with the following skills:

- Read decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Round decimals to the nearest one, tenth, and hundredth (5.NBT.4)
- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, or the relationship between addition and subtraction (5.NBT.7)
- Solve story problems involving subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)
- Solve a story problem involving finding the volume of a right rectangular prism with whole number edge lengths (5.MD.5b)

Daily Practice

The optional Round, Add & Subtract Student Book page provides additional opportunities to apply the following skills:

- Read decimals to thousandths represented with base ten numerals (5.NBT.3a)
- Round decimals to the nearest one, tenth, and hundredth (5.NBT.4)
- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, or the relationship between addition and subtraction (5.NBT.7)

Teacher Masters

GRADE 5 – UNIT 3 – MODULE 2

BRIDGES®
IN MATHEMATICS

Grid Instructions

- Color $\frac{1}{10}$ (0.1) of the grid yellow.
- Color $\frac{1}{100}$ (0.01) of the grid green.
- Color $\frac{1}{1,000}$ (0.001) of the grid blue.
- Color $\frac{1}{10,000}$ (0.0001) of the grid red.

When you color in a fraction, be sure that all the squares you color share at least one side with each other.

Label each of the fractions you color with both fraction and decimal names. When you're finished, share your papers with another pair. If your results don't match, see if you can find the problem and fix it. Be prepared to explain your thinking to the class.

Work Place Guide 3B Draw & Compare Decimals

Summary

Players draw five Number Cards and use three of them to create the largest or smallest decimal possible, as determined by a more or less spinner. After both players build their decimals, they compare to determine the winner of the round. The player who won the most rounds out of five is the winner.

Skills & Concepts

- Read decimals to thousandths represented with base-ten numerals (5.NBT.3a)
- Compare pairs of decimals to thousandths, based on an understanding of what the digit in each place represents (5.NBT.3b)

Materials

Copies	Kit Materials	Classroom Materials
TM T2 Work Place Guide 3B Draw & Compare Decimals **TM T3** 3B Draw & Compare Decimals Record Sheet **SB 82** Work Place Instructions 3B Draw & Compare Decimals	• 3 decks Number Cards, 10s and wild cards removed • 3 spinner overlays	

Assessment & Differentiation

If you see that…	Differentiate	Example
One or more students struggle to create the largest or smallest decimal possible.	SUPPORT Ask students to manipulate the Number Cards to help brainstorm possibilities before choosing a decimal to record. Review the value of tenths, hundredths , and thousandths. Play game variation A and play with fewer cards.	
Students struggle to compare and determine the winner in each round.	SUPPORT Work with students to record the expanded form of the two decimals and discuss the value of each place. Remind students to compare the tenths place first, rather than start with the thousandths. Consider offering models of decimals for students to use until they are more comfortable.	"I see that you made 0.765 as your decimal. Can you read that decimal to me? OK, let's talk about the value of each of those digits. What is the 7 worth? The 6? The 5?"
Students think strategically to create the largest or smallest decimal possible in each round and easily compare to determine the winner.	CHALLENGE Have students play game variation B and determine the exact difference in their decimal numbers. Challenge them to verbalize how and when it would be beneficial to not make the largest or smallest number possible (to still win the round, but save crucial digits for future rounds).	"You are playing for more, right, and your partner built 0.870? Let's look at your cards. You have 9, 6, 4, 8, and 5. You are right, you could win with 0.986, but I am thinking about a strategy to win the whole game and wondering if there's a reason to make a different number?"
English-Language Learners Use the following adaptations to support the ELL students in your classroom.		
• Have ELL students restate directions to ensure understanding • Provide a same-language peer, if one is available. • Play a sample game in a small group and allow opportunities for students to request clarification and rephrasing.		

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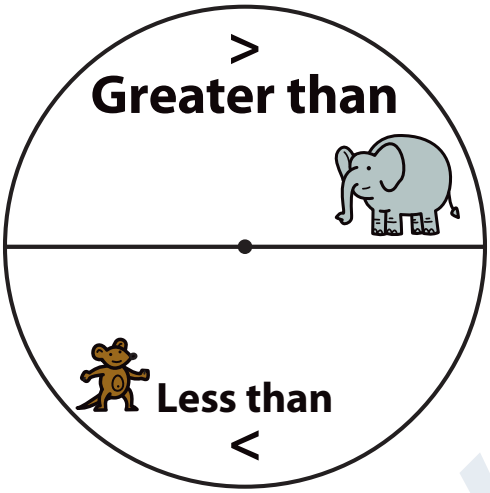
3B Draw & Compare Decimals Record Sheet

Player 1 _____ Player 2 _____



Round 1	(Circle one) Greater than Less than	Number Cards I Drew 0. _____. _____. _____ Decimal I Made	Number Cards I Drew 0. _____. _____. _____ Decimal I Made
Round 2	(Circle one) Greater than Less than	Number Cards I Drew 0. _____. _____. _____ Decimal I Made	Number Cards I Drew 0. _____. _____. _____ Decimal I Made
Round 3	(Circle one) Greater than Less than	Number Cards I Drew 0. _____. _____. _____ Decimal I Made	Number Cards I Drew 0. _____. _____. _____ Decimal I Made
Round 4	(Circle one) Greater than Less than	Number Cards I Drew 0. _____. _____. _____ Decimal I Made	Number Cards I Drew 0. _____. _____. _____ Decimal I Made
Round 5	(Circle one) Greater than Less than	Number Cards I Drew 0. _____. _____. _____ Decimal I Made	Number Cards I Drew 0. _____. _____. _____ Decimal I Made

(continued on next page)

Comparing Decimal Numbers

1 Jana says that 0.16 is greater than 0.4 because 16 is greater than 4. Do you agree with her? Use numbers, words, or labeled sketches to explain your answer.

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Decimal Equivalencies Work Sample

1 Jacob says that 0.400 and 0.004 are equal. Do you agree with him? Use numbers, words, or labeled sketches to explain your answer.

2 Ivy says that 0.6 and 0.60 and 0.600 are equal. Do you agree with her? Use numbers, words, or labeled sketches to explain your answer.

Work Place Guide 3C Round & Add Tenths

Summary

Players roll dice and arrange the two resulting digits to form a number having ones and tenths. Then they round their decimal to the nearest whole number. Players take turns making and rounding numbers until all whole numbers on the record sheet number line are claimed. Players add their numbers, and the player with the greatest sum wins.

Skills & Concepts

- Read and write decimal numbers with digits to the hundredths place (5.NBT.3a)
- Round decimals to the nearest one (5.NBT.4)
- Add decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)

Materials

Copies	Kit Materials	Classroom Materials
TM T6 Work Place Guide 3C Round & Add Tenths **TM T7** 3C Round & Add Tenths Record Sheet **SB 84** Work Place Instructions 3C Round & Add Tenths	• 3 dice numbered 0–5 • 3 dice numbered 4–9	• colored pencils, 1 red and 1 blue for each student pair

Assessment & Differentiation

If you see that…	Differentiate	Example
Students are having trouble rounding decimals to the nearest whole number.	SUPPORT Invite students to put the numbers on a number line to see which whole it is closer to.	"You made 3.8, right? Which whole numbers does 3.8 come between? Right, 3 and 4. Let's put those numbers on a number line. How far away from 3 is 3.8? How far away from 4?"
One or more students continue to build numbers that round to claimed numbers.	SUPPORT Have students tell both numbers that can be made from the digits rolled and tell the whole number that each would round to.	"What numbers can you make with your 4 and 6? 4.6 and 6.4, good. 4.6 would round to what? How about 6.4? Let's look at your record sheet to see if either of those whole numbers are unclaimed."
Students struggle to add decimals.	SUPPORT Give student base ten pieces to use when finding totals. Or name the decimals as money to help students realize the relationships.	
Students easily add decimal amounts to find the total.	CHALLENGE Have students compare the decimal total with the whole number rounded total for both players and look for patterns.	
Students use a strategy to make numbers that round to an unclaimed whole number.	CHALLENGE Have players try game variation B and play with hundredths.	

English-Language Learners Use the following adaptations to support the ELL students in your classroom.

- Have ELL students observe other students playing the game before playing it themselves.
- Pair each ELL student with a supportive partner (an English speaking student or another ELL student with more command of English) who can offer support and explain the instructions while they play.
- Play the game with the ELL students yourself. Model how to play and put emphasis on strategies used to round to the nearest whole number.
- Once students are playing the game with understanding, try to get them to verbalize and demonstrate their strategies.

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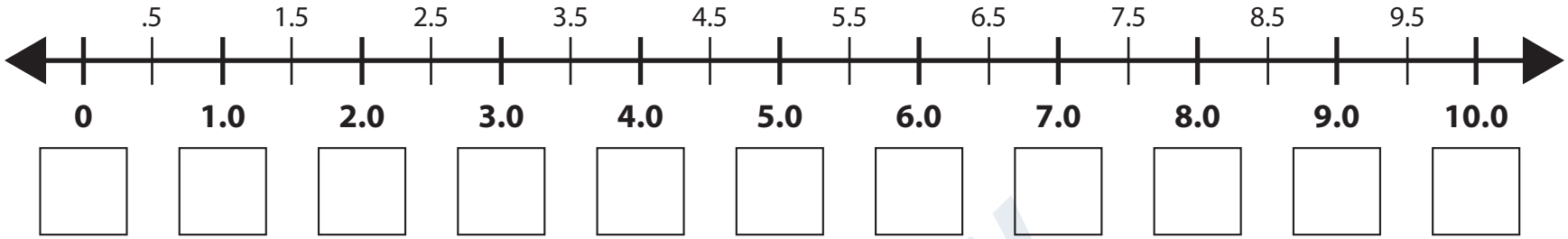
3C Round & Add Tenths Record Sheet



Red Player	**Blue Player**
Red Player's Total	**Blue Player's Total**

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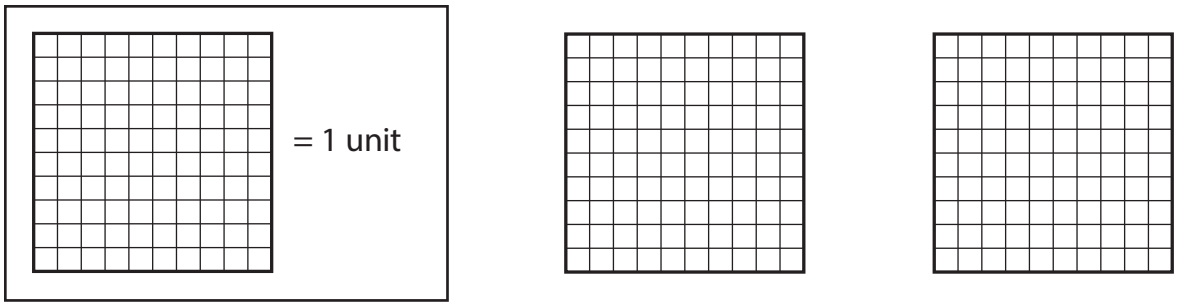
Decimal Place Value Checkpoint 1

1 Use labeled sketches on one or both grids, along with words and numbers to explain how the number 0.30 can mean $\frac{30}{100}$ *and* $\frac{3}{10}$ at the same time.



2 Write 7.793 in words.

3 Write the number seventy three and nine hundred fifteen thousandths.

4 Compare the pairs of decimals. Fill in each blank with < , >, or =.

a 5.1 ____ 5.09 **b** 1.59 ____ 1.955 **c** 9.055 ____ 1.955

5 Find the sums and differences.

a 5 + 2.3 **b** 5 + 0.23

c 5.1 + 2.3 **d** 9.37 – 6

e 9.37 – 0.6 **f** 9.37 – 1.6

Work Place Guide 3D Target One

Summary

Each player gets six Number Cards. Players choose four cards to make two numbers whose sum is as close to 1 as possible. They add the numbers and write an equation. Their score is the difference between their sum and 1. After five rounds, the player with the lower score wins the game.

Skills & Concepts

- Add and subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction (5.NBT.7)
- Relate strategies for computing with decimals to hundredths to written methods (5.NBT.7)
- Use written numbers and symbols to represent strategies for computing with decimals to hundredths (5.NBT.7)
- Explain the reasoning behind strategies for computing with decimals to hundredths (5.NBT.7)

Materials

Copies	Kit Materials	Classroom Materials
TM T9 Work Place Guide 3D Target One **TM T10** 3D Target One Record Sheet **SB 86** Work Place Instructions 3D Target One	• 3 decks Number Cards	

Assessment & Differentiation

If you see that…	Differentiate	Example
One or more students are struggling to add with decimals.	SUPPORT Have students play a few rounds of Target 100 with the same record sheet and directions but using whole numbers. Then have them think about the strategies that were most helpful and try to apply them to Target 1.	
One or more students are struggling to add the numbers efficiently and correctly.	SUPPORT Model the addition on an open number line and encourage students to find the best strategy for the numbers they have (getting to a friendly number, jumping to a friendly number, jumping too far and adjusting).	"The procedure for adding decimal numbers is a lot like the one for adding whole numbers, isn't it? Let's look at some strategies we can use with a number line to help think about the numbers."
One or more students are having a difficult time finding the score.	SUPPORT Draw a number line and place 1 in the middle. Ask the student to place the score in relation to the 1 and discuss it.	"Let's see. Your total is 0.72. About where would that be on this number line? OK, and how close is 0.72 to your target of 1?"
Students are struggling with place value.	SUPPORT Use base ten area pieces to model the numbers.	
Students can add decimal numbers and find their score.	CHALLENGE Encourage students to be sure they have found the best possible combination of their cards and are using the most efficient strategy to find their sum and score.	"It looks like you are doing well adding and subtracting decimals. Do you have any strategies you are using that you think will help you win?"
Students readily find the best combination and efficiently add/subtract.	CHALLENGE Have students add the wild cards into the deck. This allows for more abstraction as students consider which numbers would work best.	

English-Language Learners Use the following adaptations to support the ELL students in your classroom.

- Review decimal numbers, focusing on the meaning of tenths and hundredths.
- As you demonstrate, either with the whole class or a small group of ELL students, be explicit in your modeling. Emphasize your choices with gestures and key words. When writing your scores, put a star next to the lowest score.
- Provide a same-language peer, if one is available.

3D Target One Record Sheet

Name_____ Partner _____

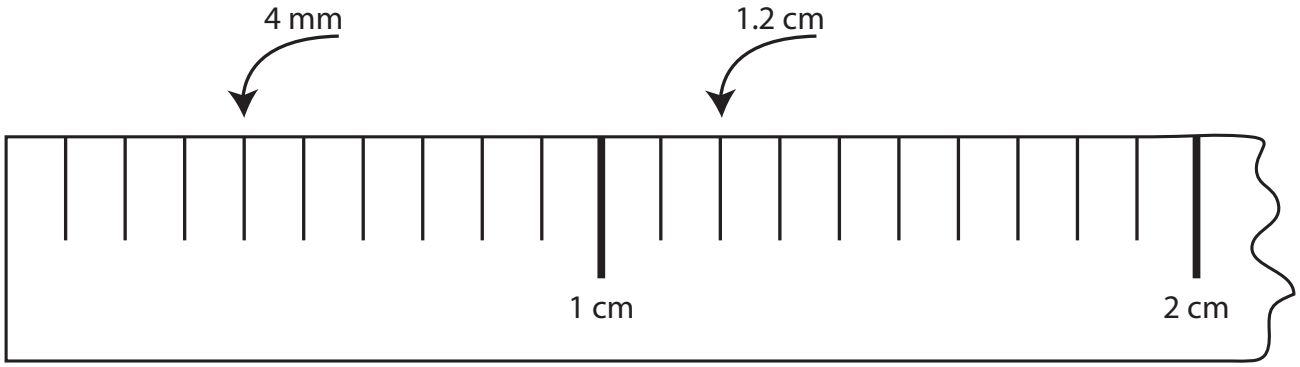
First Game	Sum	Score	Partner's Score
1 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
2 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
3 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
4 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
5 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
My Final Score _____	My Partner's Final Score _____		

Second Game	Sum	Score	Partner's Score
1 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
2 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
3 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
4 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
5 0.____ ____ + 0 .____ ____ =	____.____ ____	0.____ ____	
My Final Score _____	My Partner's Final Score _____		

Number Line Fractions

$\frac{1}{8}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{1}{5}$	$\frac{2}{5}$
$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{10}$

Ten Millimeters in a Centimeter



The marks are 1 millimeter, or $\frac{1}{1000}$ of a meter, apart.

Student Book

GRADE 5 – UNIT 3 – MODULE 2

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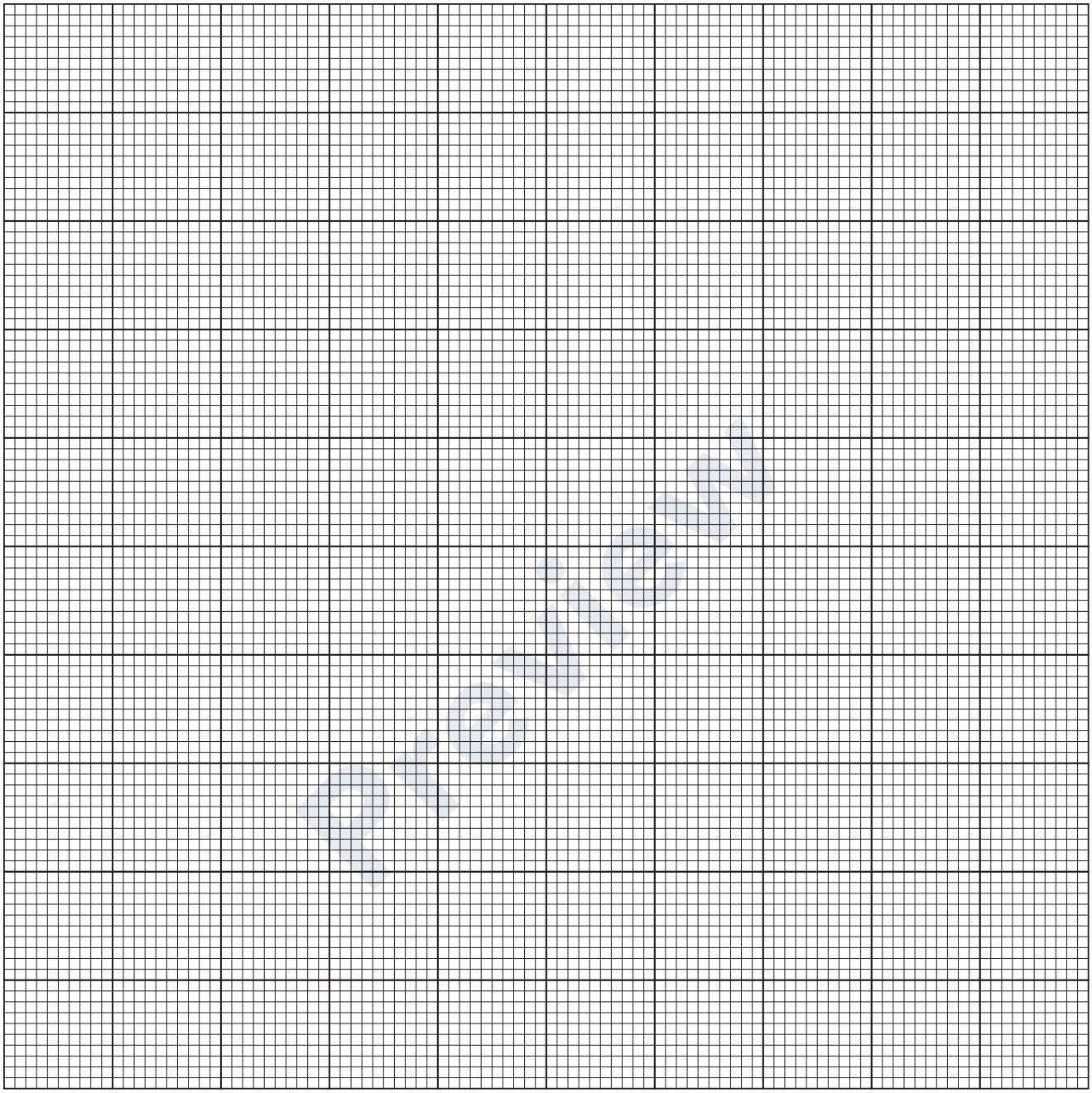

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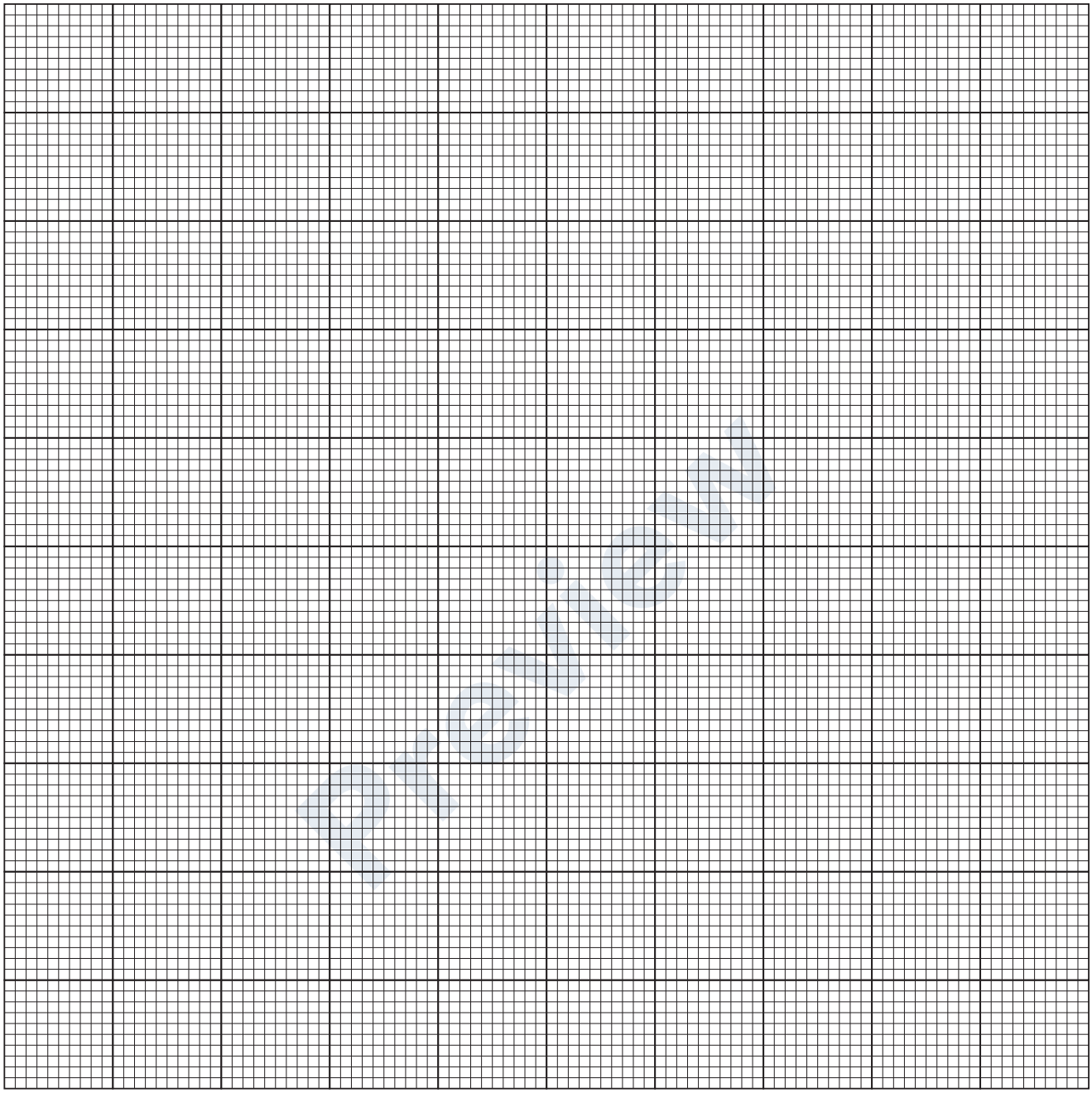
Decimal Grid page 2 of 2



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Thinking About Thousandths

1 Label each digit in the numbers below with its place value name. The first one is done for you as an example.

3	2	.	0	3	7	1	.	0	6	1	3	4	.	7	5	3	1	4	2	.	0	0	5
3 tens	2 ones		0 tenths	3 hundredths	7 thousandths																		

2 Complete the chart below.

	Number	Number Name Written Out in Words
a	0.540	
b	1.503	one and five hundred three thousandths
c	11.07	
d		one and four hundred twenty-nine thousandths
e	7.005	
f		zero and four thousandths

3 Mr. Mugwump is confused. He doesn't know which is more, 5.200 or 5.002. Draw or write something that will help him understand which number is greater and why.

Work Place Instructions 3B Draw & Compare Decimals

Each pair of players needs:

- 1 deck of Number Cards, 10s and wild cards removed
- 1 spinner overlay
- a 3B Draw & Compare Decimals Record Sheet to share
- 2 pencils

1 Decide who will be Player 1 and who will be Player 2.

2 Remove the 10s and wild cards from the deck of Number Cards, if necessary.

3 One player spins the more or less spinner and circles either *more* or *less* for Round 1 on the record sheet.

4 Player 1 draws five Number Cards and records the digits on the "Number Cards I drew" line of the record sheet. A wild card may represent any digit, 0–9.

5 Player 1 uses three of the digits to make either the largest or smallest decimal possible, as determined by the more or less spinner.

- Then Player 1 reads the decimal aloud to his partner.
- Player 1 records his decimal on the record sheet and returns the three used cards to the bottom of the deck. The two unused cards will be needed by Player 2.

6 Player 2 draws three new digit cards and records them, along with the two cards remaining after Player 1's turn, on the "Number Cards I drew" line of the record sheet.

7 Player 2 uses three of the digits to make either the largest or smallest decimal possible, as determined by the more or less spinner.

- Then Player 2 reads the decimal aloud to her partner.
- Player 2 records her decimal on the record sheet and returns the three used cards to the bottom of the deck. The two unused cards will be needed by Player 1.

8 The player with the greatest or least 3-digit decimal, as determined at the beginning of the game, wins the round and circles her decimal on the record sheet.

9 Play continues for five rounds. The winner of the game is the player who wins the most rounds.

Game Variations

A Players each draw three Number Cards instead of five, and use those three to build the largest or smallest decimal possible.

B Players determine how much larger or smaller their decimal is compared to their partner's.

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Playing Draw & Compare Decimals

1 Carmen is playing Draw & Compare Decimals with her partner. Carmen drew 4, 7, 6, 0, and 2 and has to use three of the cards to make a decimal number less than 1.

0 . _____ _____ _____

a If they are playing for "more," what decimal should Carmen make?

b If they are playing for "less," what decimal should Carmen make?

2 James and Ryan are also playing Draw & Compare Decimals. They are playing for less, and James made the decimal 0.149 with his digit cards.

a Ryan drew the following cards: 5, wild card, 0, 7, and 2. Does Ryan need to use his wild card to win the round?

b List two decimals that Ryan could create to win the round.

3 Shawn and Jane are playing Draw & Compare Decimals and are playing for more. Shawn made 0.879 and Jane made 0.987. Both students say they won the round.

a Who is correct?

b Explain how you know.

4 Find the sums. Show your thinking.

a \$57.99 + \$14.25

b \$23.45 + \$19.99

c \$1,689 + \$145

Work Place Instructions 3C Round & Add Tenths

Each pair of players needs:

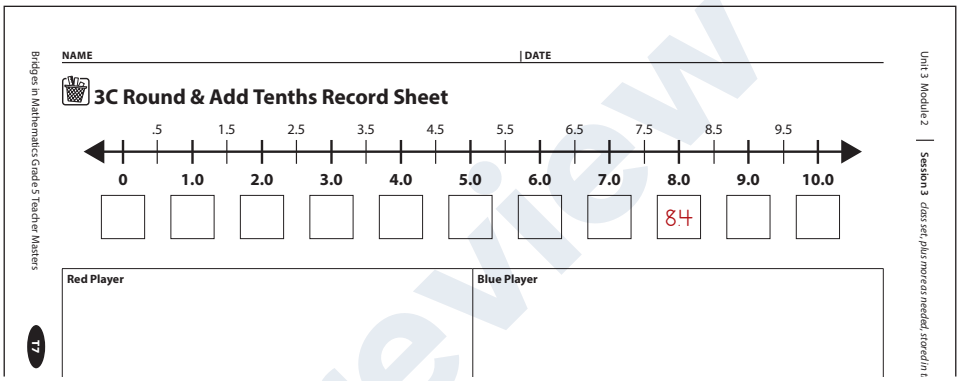
- a 3C Round & Add Tenths Record Sheet to share
- colored pencils, 1 red and 1 blue
- 2 regular pencils
- 1 die numbered 0–5
- 1 die numbered 4–9

1 Players take turns rolling one of the dice. The player with the higher number is the Red Player.

- The Red Player goes first and will record his numbers in red.
- The other player is the Blue Player and will record her numbers in blue.

2 The Red Player rolls both dice and decides which number to put in the ones place and which to put in the tenths place.

- The Red Player records the decimal number he made in red under the whole number to which it rounds.


NAME | DATE

3C Round & Add Tenths Record Sheet

.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5

0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0

8.4

Red Player | Blue Player

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3 The Blue Player rolls both dice and then decides which number to put in the ones place and which to put in the tenths place.

- The Blue Player records the decimal number she made in blue under the whole number to which it rounds.

4 Players continue taking turns.

- Each whole number box can only be used once.
- If a player cannot make a number that rounds to an unclaimed whole number, that turn is lost.

5 At any point in the game, a player may choose to roll a single die to try to claim the 0 or 1.

6 Once all the whole numbers are claimed, players predict who will have the largest score.

7 Players add and compare their scores. They circle the highest score on the record sheet to indicate the winner.

Game Variations

A Each player rolls the dice for herself, but her partner chooses which digit goes in the ones place and which goes in the tenths place.

B Players roll three dice and make numbers in the hundredths place to play "Roll & Add Hundredths."

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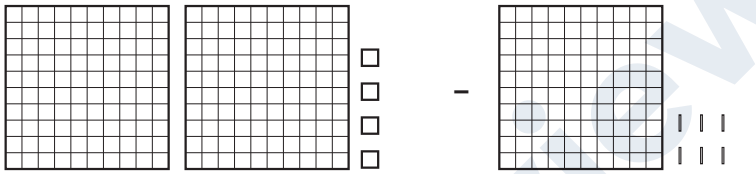
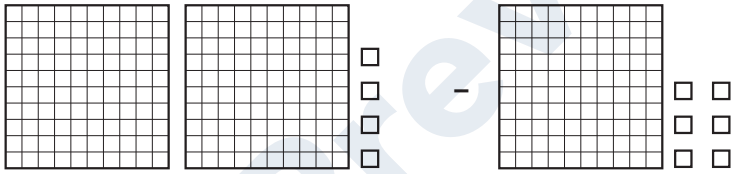
Model, Add & Subtract Decimals

1 Write an expression to match each model.

Model	Expression
a 	
b 	
c 	
d 	

2 Carl has two dogs. They are black Labrador retrievers. The male weighs 31.75 kg and the female weighs 29.48 kg.

a How much heavier is the male than the female? Show your work.

b How much do they weigh together? Show your work.

Work Place Instructions 3D Target One

Each pair of players needs:

- a 3D Target One Record Sheet for each player
- 1 deck of Number Cards
- math journals
- 2 pencils

1 Player 1 goes first and Player 2 is the dealer. Player 2 passes out six cards to each player.

2 Player 1 chooses four cards to make two decimal numbers to hundredths.

3 Player 1 adds the two numbers in her math journal, trying to get as close as possible to the target of 1. Each card can only be used once.

4 Player 1 explains how she added the two numbers and then writes an equation with the numbers and their sum on the record sheet.

Player 2 checks the sum.

5 Player 1 figures her score by finding the difference between the sum and 1. Both players record Player 1's score on their own record sheets.

A sum of 0.96 has a score of 0.04. A sum of 1.07 has a score of 0.07. A sum of 1.00 has a score of 0.

6 Then Player 2 takes a turn and Player 1 checks his work.

7 At the end of each turn, players put all the used cards face up in a discard stack and deal out four new cards to each player so that both have six cards again.

8 Players continue to take turns.

9 After five rounds, players add their scores to determine the winner. The lower score wins the game.

Game Variations

A Players add wild cards to their deck of Number Cards. A wild card can be any numeral 0–9. If a wild card is used, players put a star above the number made from the wild card in the equation on the record sheet.

B Sums below 1 get a negative score. Sums above 1 get a positive score. Players add those scores together and the final score closest to 0 wins.

C Play Target One with numbers in the thousandths place instead of the tenths place, using all 6 cards.

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Working with Decimals

1 Label each digit in the numbers below with a multiplication expression that shows its place value. The first one is done for you as an example.

3	2	.	5	3	7		2	.	1	7	5		6	1	.	3	9	4		2	3	6	.	9	2	4
3×10	2×1		$5 \times (\frac{1}{10})$	$3 \times (\frac{1}{100})$	$7 \times (\frac{1}{1000})$																					

2 Round each of the numbers in problem 1 to the nearest tenth and nearest hundredth. The first one is done for you as an example.

Number	Rounded to the Nearest Tenth	Rounded to the Nearest Hundredth
32.537	32.5	32.54
2.175		
61.394		
236.924		

3 Complete the chart.

Number	Number Name Written in Words	Fraction Equivalent
0.639		$\frac{639}{1000}$
1.613	one and six hundred thirteen thousandths	
12.067		
	two and three hundred sixty-five thousandths	
9.004		$9\frac{4}{1000}$
	zero and five thousandths	

4 Compare the pairs of decimals. Fill in each blank with < , >, or =.

a 25.04 ____ 25.4 **b** 67.250 ____ 67.205 **c** 11.110 ____ 11.011

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Fractions & Decimals Chart

		$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{1}{3}$
Tenths	**Fraction**									
	Decimal									
Hundredths	**Fraction**									
	Decimal									
Thousandths	**Fraction**									
	Decimal									

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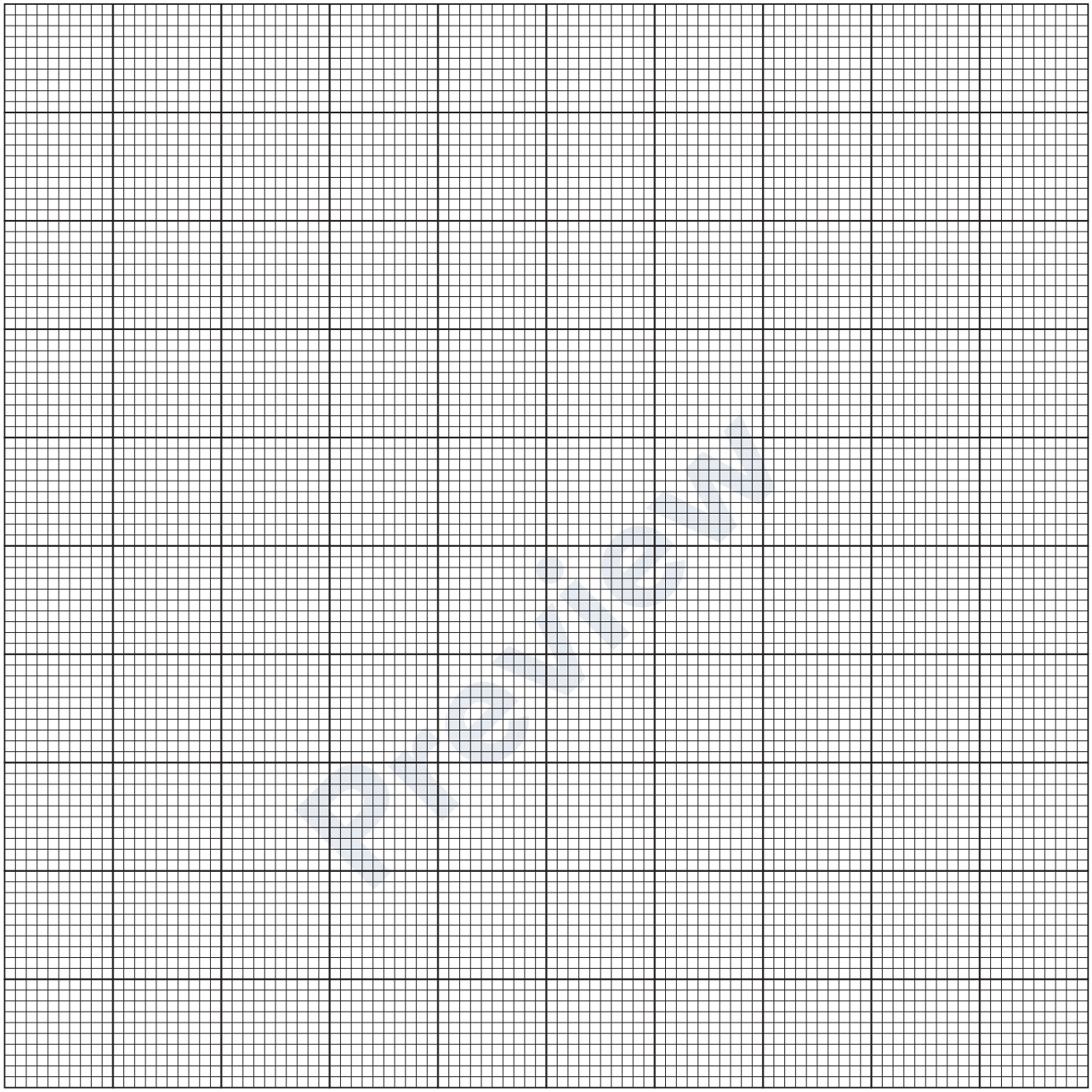
Decimal Grid page 1 of 2



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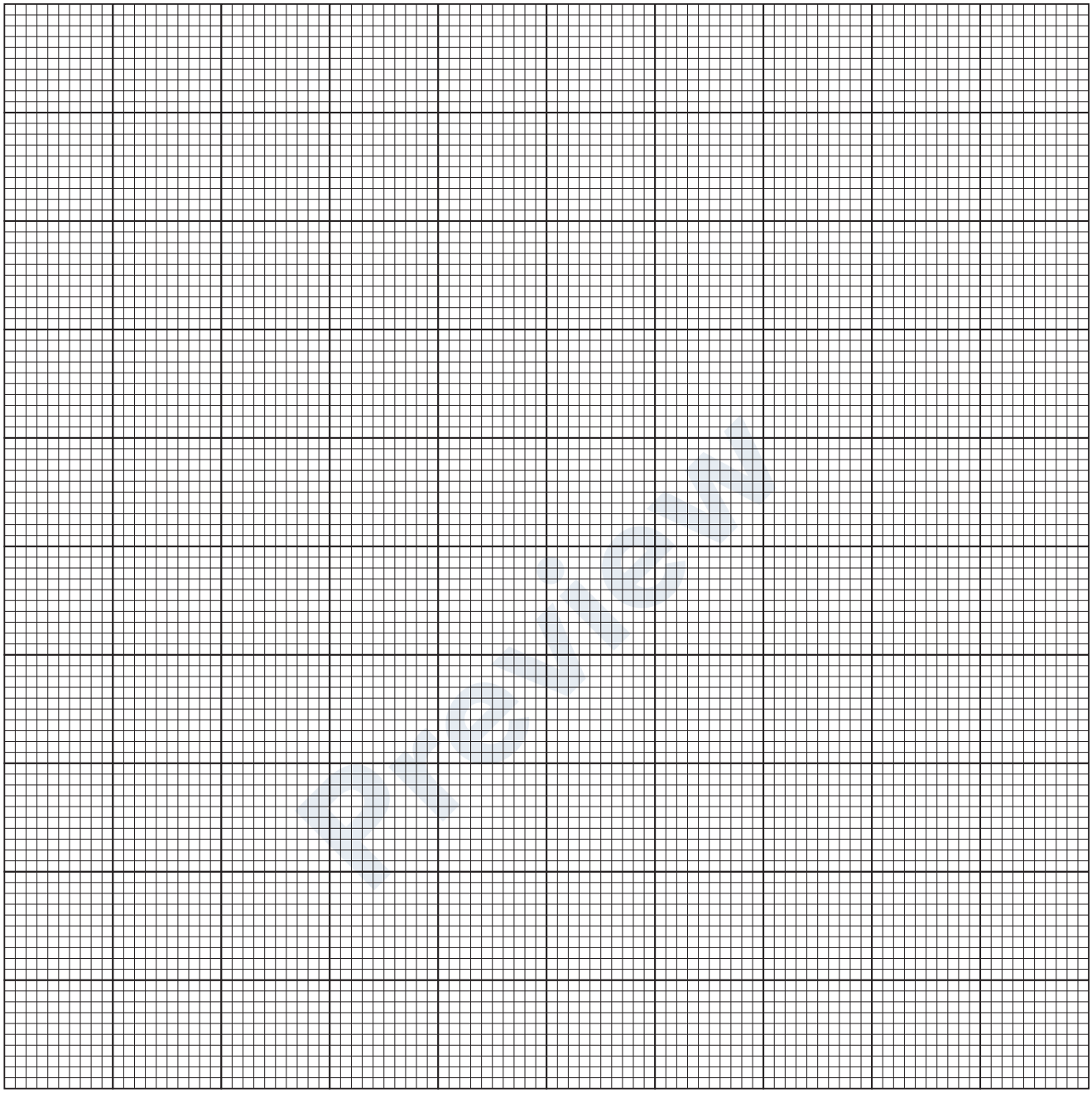
Decimal Grid page 2 of 2



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Fractions, Decimals & Money

1 Fill in the chart. Use any tools to help except a calculator. The first row has been completed as an example.

Fraction of a Dollar	Coin Name	Dollars & Cents Notation	Decimal
$\frac{1}{2}$	half dollar	$0.50	0.50
$\frac{1}{4}$			
$\frac{1}{10}$			
$\frac{1}{5}$			
$\frac{1}{20}$			
$\frac{1}{100}$			

2 How would you write 0.35 as:

a a fraction?

b in dollars and cents notation?

3 How would you write $0.60:

a as a fraction?

b as a decimal?

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Decimal Practice

1 Practice adding decimals by playing this game. Please don't use a calculator. If you can get the answers in your head, that's fine. If you need to do some paper and pencil work, show your work next to the game board.

a Choose 2 numbers from the box at the right and add them.

b Circle the sum of the numbers on the game board.

c Try to find four sums in a row, column, or diagonal.

d There is one number on the board that is a mistake. As you play, see if you can tell which number is the mistake and circle it. The sooner you find it, the easier it will be to get four in a row!

3.26	5.16	7.12	8.05
6.4	4.55	3.62	4.5
6.81	1.27	2.9	6.45
5.88	7.17	5.52	6.76

0.5
2.76
3.12
2.4
4.05
4

2 Write four decimal numbers that have an even digit in the tenths place, an odd digit in the hundredths place, and an even number in the thousandths place.

3 Put the decimals you wrote for problem 2 in order from least to greatest.

_____ < _____ < _____ < _____

4 Write the four decimals using number names (words).

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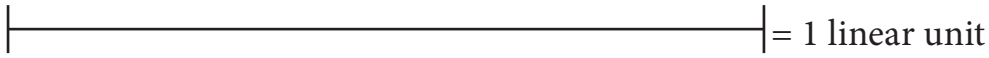
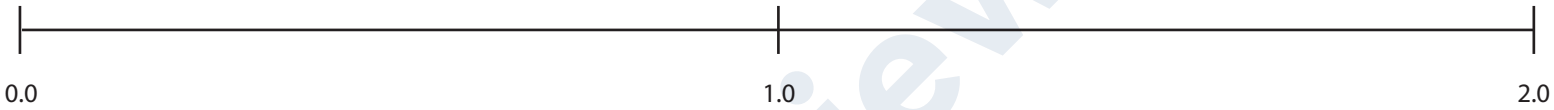
Decimals on a Number Line



1 Use a base ten linear piece to locate and mark these decimals on the number line. Write the numbers above the line.

0.1 0.4 0.8 1.2 1.5 1.8



2 Mark and label the approximate locations of these decimals on the number line. Write the numbers below the line.

0.25 0.75 0.62 1.55 0.04 1.91 1.08 1.69

3 Continue to use a base ten linear piece to help you determine which numbers on the number line are:

a between $\frac{1}{2}$ and $\frac{9}{10}$: _____, _____, _____

b closest to but not equal to 0.7: _____

c between 0.9 and 1.2: _____

d less than $\frac{1}{2}$: _____, _____, _____, _____

e less than $1\frac{3}{4}$ but greater than $1\frac{1}{5}$: _____, _____, _____

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Round, Add & Subtract Decimals

1 Round each decimal number to the nearest whole number.

a 2.6

b 3.35

c 17.8

2 Round each decimal number to the nearest tenth.

a 0.15

b 0.72

c 2.03

3 **CHALLENGE** Round each decimal number to the nearest hundredth.

a 0.678

b 3.196

c 0.997

4 Solve.

1.43	5.99	3.09
+ 2.58	– 3.26	+ 2.67

5 Solve.

16.03 – 12.42 = 10.18 + 15.07 = 99.99 – 3.79 =

Home Connections

GRADE 5 – UNIT 3 – MODULE 2

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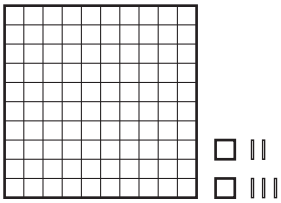
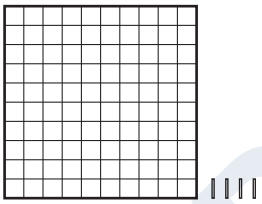
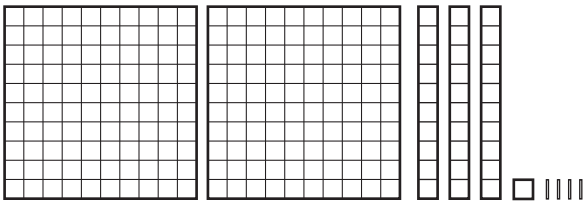
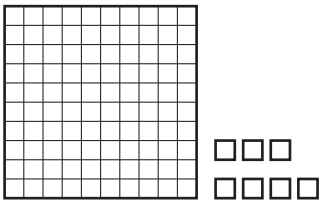
Modeling Decimals page 1 of 2

The base ten models below can be used to represent decimal numbers.

1 whole | 1 tenth | 1 hundredth | 1 thousandth

1 Write the number that each model represents.

Model	Decimal Number
ex 	1.025
a 	
b 	
c 	

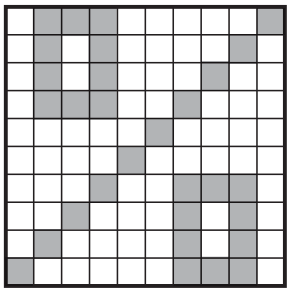
(continued on next page)

NAME | DATE

Modeling Decimals page 2 of 2

2 For each question, fill in the missing decimal or fraction equivalent(s), or shade the grid to match the missing numbers.

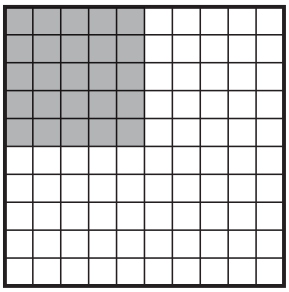
a



Decimal:

Fraction Equivalent(s):

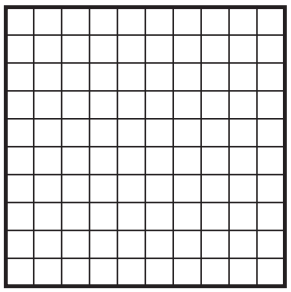
b



Decimal:

Fraction Equivalent(s):

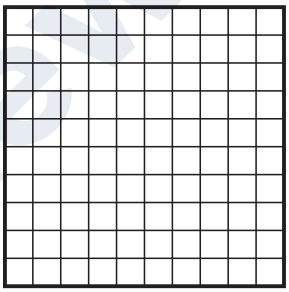
c



Decimal: **0.2**

Fraction Equivalent(s):

d



Decimal:

Fraction Equivalent(s): $\mathbf{\frac{60}{100}}$

3 **CHALLENGE** Julian walked $\frac{6}{10}$ of a mile to his friend's house and then another $\frac{35}{100}$ of a mile to the store. He walked $\frac{1}{4}$ of a mile back home. Julian's sister said he walked $1\frac{1}{5}$ miles. Do you agree? Why or why not?

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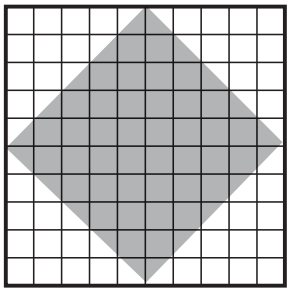
Decimal & Fraction Grids page 1 of 2

For each question, fill in the missing decimal or fraction equivalent(s), or shade the grid to match the numbers given.

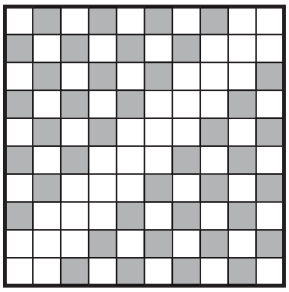
1



Decimal:

Fraction Equivalent(s):

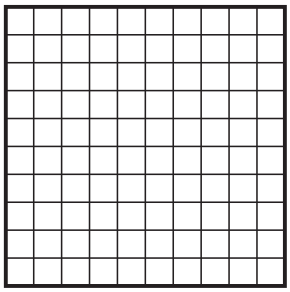
2



Decimal:

Fraction Equivalent(s):

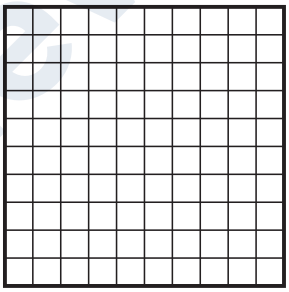
3



Decimal: **0.5**

Fraction Equivalent(s):

4



Decimal:

Fraction Equivalent(s): $\frac{70}{100}$

5 Use one of these symbols (< , >, or =) to compare each pair of decimal numbers.

a 6.0 ____ 6.00

b 5.514 ____ 5.541

c 13.04 ____ 13.4

d 32.130 ____ 32.103

e 10.010 ____ 10.100

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Decimal & Fraction Grids page 2 of 2

6 Round each decimal to the nearest one, tenth, and hundredth. (Hint: Look at the digit to the right of the place to which you're rounding. If it's less than 5, round down. If it's 5 or more, round up.)

	Number	To the Nearest 1	To the Nearest Tenth	To the Nearest Hundredth
ex	4.862	5.0	4.9	4.86
a	0.048			
b	14.964			
c	7.065			
d	194.124			

7 Complete the table below to show each fraction as a decimal, and each decimal as a fraction.

	Fraction	Decimal
a	$\frac{3}{4}$	
b		0.20
c	$\frac{3}{100}$	
d		0.72
e	$\frac{6}{10}$	

8 **CHALLENGE** Riley collected rain for several weeks in a rain gauge. He collected 1.48 inches the first week, half that much the second week, and one inch the third week. How much more rain will Riley need to collect before he has 5 inches?

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Read, Write & Compare Decimals page 1 of 2

1 Complete the chart.

Base-Ten Numeral	Expanded Form
25.893	$(2 \times 10) + (5 \times 1) + (8 \times \frac{1}{10}) + (9 \times \frac{1}{100}) + (3 \times \frac{1}{1000})$
7.043	
4.570	
	$(3 \times 1) + (6 \times \frac{1}{10}) + (1 \times \frac{1}{100}) + (3 \times \frac{1}{1000})$
	$(6 \times 1) + (4 \times \frac{1}{10}) + (9 \times \frac{1}{100})$
0.317	
	$(1 \times 10) + (8 \times \frac{1}{10}) + (6 \times \frac{1}{100}) + (3 \times \frac{1}{1000})$

2 Complete the chart.

Base-Ten Numeral	Number Name
1.893	one and eight hundred ninety-three thousandths
0.600	
1.503	
1.013	
	two and two thousandths
0.037	
	forty thousandths

3 List the decimals from problem 2 in order from least to greatest. Include the example.

_____ < _____ < _____ < _____ < _____ < _____ < _____

NAME | DATE

Read, Write & Compare Decimals page 2 of 2

4 Fill in the bubble to show which of the two decimal numbers is greater. Use numbers, words, or labeled sketches to explain your answer. How do you know the number you've selected is greater?

◯ 1.200

◯ 1.002

5 Write four decimal numbers that are less than 1.004.

_____, _____, _____, _____

6 Write four decimal numbers that have an even number in the tenths place, an odd number in the hundredths place, and a prime number in the thousandths place.

_____, _____, _____, _____

7 **CHALLENGE** Rob baby sits the kids next door every day after school for 1.5 hours. He earns $3.50 an hour. How much money will he earn in 6 weeks if school is in session 5 days a week the whole time? Show your work.

NAME | DATE

More Decimal Practice page 1 of 2

1 Round each decimal number to the nearest whole number.

a 9.7

b 16.45

c 25.3

2 Round each decimal number to the nearest tenth.

a 1.65

b 0.31

c 8.07

3 **CHALLENGE** Round each decimal number to the nearest hundredth.

a 0.351

b 0.289

c 3.016

4 Solve.

8.53	8.98	17.89
+ 2.48	– 4.76	+ 12.12

5 Solve. Show your work.

9.98 – 2.53 = 7.68 + 13.07 = 100.03 – 16.28 =

(continued on next page)

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More Decimal Practice page 2 of 2

Story Problems

Show your work using numbers, labeled sketches, or words.

6 Rachel has $10.00. She wants to buy a book that costs $6.79. Will she have enough money left over to buy a pen for $3.50? Explain.

7 Diego has 3 dollar bills, 3 quarters, 1 dime, and 7 pennies. Sam has 2 dollar bills, 5 quarters, 6 dimes, and 9 pennies.

a Who has more money? How much more?

b How much money do the boys have in all?

Review: Show your work using numbers, labeled sketches, or words.

8 Tonya has a box that measures 12 cm by 7 cm by 19 cm. What is the volume of the box?

9 Eric is keeping track of rainwater. On Monday, it rained $1\frac{3}{4}$ cm. On Tuesday it rained $2\frac{1}{8}$ cm. How much more did it rain on Tuesday than on Monday?

