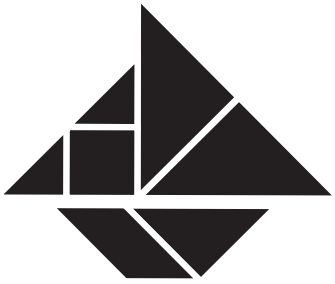


Teachers Guide

GRADE 5 – UNIT 4 – MODULE 2

BRIDGES™
IN MATHEMATICS

Module 2

More Multiplication & Division Strategies

Session 1 Multiplication Battle 3

Session 2 Callie's Charts 11

Session 3 Callie's Ratio Tables 17

Session 4 Over & Under 25

Teacher Masters

Pages renumber with each module.

Multiplication Work Sample T1

Work Place Guide 4B Multiplication Battle T2

4B Multiplication Battle Record Sheet T3

Multiplication & Division Checkpoint T4

Student Book Pages

Page numbers correspond to those in the consumable books.

Work Place Instructions 4B Multiplication Battle 119

Find the Product 121

Callie's Soccer Cleats 122

Multiplication Battle 124

More Planning for Callie 125

With or Without 128

Over & Under 129

Making Cupcakes 130

Home Connections Pages

Page numbers correspond to those in the consumable books.

Multiplication Strategies 71

Dante's Decision 73

Module 2

More Multiplication & Division Strategies

Overview

In Module 2, students investigate multiplication and division with decimals, using the context of money as they find the costs of making homemade items to sell. In the process, they explore the relationships between quarters of dollars, ¼ and 0.25, ¾ and 0.75, and think about how those relationships help in solving combinations that involve multiplying or dividing by 25, 75, and other closely related numbers such as 24, 26, 74, and 76.

Planner

Session & Work Places Introduced	P&I	PS	MF	WP	A	HC	DP
Session 1 Multiplication Battle In this session, students participate in a multiplication problem string that connects fractions, decimals, and whole numbers. They also complete a Multiplication Work Sample. Then they learn Work Place 4B Multiplication Battle. **Work Place 4B** Multiplication Battle Players take turns drawing Number Cards and multiplying the three numbers. Once the product is determined, the player has the option of drawing one more card from the deck and multiplying or dividing the original product by that number. The lower total wins if the partners rolled "less" at the start of the round; the higher total wins if they rolled "more" at the start of the round.		●		●	●	●	●
Session 2 Callie's Charts Students continue to consider the relationships between fractions, decimals, and whole numbers as they multiply various numbers by ¼, 0.25, 25 and ¾, 0.75, and 75 during a problem string. Next, they work first as a whole class and then individually or in pairs to solve some more problems related to Callie's fundraising efforts.	●	●					●
Session 3 Callie's Ratio Tables Students participate in a multiplication string that emphasizes the use of fractions as operators and reinforces the connection between ¼ and 0.25. Then students share strategies for filling in the ratio tables they worked with last session. The class discusses the use of ratio tables to represent both multiplication and division equations, and students work on the More Planning for Callie Student Book page.	●	●				●	●
Session 4 Over & Under Students begin this session by taking the Multiplication & Division Checkpoint. Then they work on an assignment in their Student Books in which they solve multiplication problems using relationships between fractions, decimals, and whole numbers. Toward the end of the session, the teacher reconvenes the class to share and discuss strategies.	●				●		●

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–T4 according to the instructions at the top of each master.	
	Run a single display copy of Student Book pages 122, 125, and 129.	
	Run 4 blank copies of the first Callie's Soccer Cleats Student Book page (122) to record students' thinking. Alternatively, lay a blank overhead transparency over a single copy of the sheet and move the transparency as needed.	
	If students do not have their own Student Books, run a class set of Student Book pages 119–130.	
	If students do not have their own Home Connections books, run a class set of the assignments for this module using pages 71–74 in the Home Connections Book.	
Work Place Preparation	Prepare the materials for Work Place 4B using the list of materials on the Work Place Guide (Teacher Masters T2).	

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
Multiplication Battle

Summary

In this session, students participate in a multiplication problem string that connects fractions, decimals, and whole numbers. They also complete a multiplication work sample. Then they learn Work Place 4B Multiplication Battle. Finally, the teacher introduces and assigns the Multiplication Strategies Home Connection.

Skills & Concepts

- Multiply a 2- or 3-digit whole number by a 1-digit whole number using strategies based on place value and the properties of operations (4.NBT.5)
- Write and evaluate numerical expressions with parentheses (5.OA.1)
- Multiply decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (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)
- Multiply a whole number by a fraction (5.NF.4a)
- Make sense of problems and persevere in solving them (5.MP.1)
- Construct viable arguments and critique the reasoning of others (5.MP.3)

Materials

Copies	Kit Materials	Classroom Materials
Problem String Multiplying Fractions, Decimals & Whole Numbers		
		• student journals
Assessment Multiplication Work Sample		
TM T1 Multiplication Work Sample		
Work Places Introducing Work Place 4B Multiplication Battle		
TM T2 Work Place Guide 4B Multiplication Battle **TM T3** 4B Multiplication Battle Record Sheet **SB 119–120*** Work Place Instructions 4B Multiplication Battle	• 1 deck of Number Cards (see Preparation) • 1 more/less cube	
Home Connection		
HC 71–72 Multiplication Strategies		
Daily Practice		
SB 121 Find the Product		

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

Preparation

- Remove the 0s, 1s, and wild cards from the deck of Number Cards and put them aside. Shuffle the remaining cards thoroughly.
- In today's session, you'll introduce Work Place 4B Multiplication Battle. Before this session, you should review the Work Place Guide, as well as the Work Place Instructions. Make copies of the 4B Multiplication Battle Record Sheet for use today, and store the rest in the Work Place 4B Multiplication Battle tray.

Problem String

Multiplying Fractions, Decimals & Whole Numbers

1 Open the session by explaining that today students will participate in a problem string, complete a work sample, and learn a new Work Place game.

2 Ask students to write today's date on a fresh page in their journals and title it Multiplying Fractions, Decimals & Whole Numbers Problem String.

3 Deliver the problem string.

- Pose each problem one at a time by writing the combination on the board.
- Give students time to work in their journals.
- Solicit and record all answers to a given problem, and then invite one or two students to share how they solved the problem.
- Model students' strategies on open arrays or ratio tables.

The purpose of today's problem string is to continue to make connections between the fraction ¼, the decimal 0.25, and the whole number 25. Students will likely use a variety of strategies to solve each problem. Model a few of these strategies for each problem. After the first three combinations, stop to examine the relationships between the problems and answers. Then do the same after a second set of three combinations.

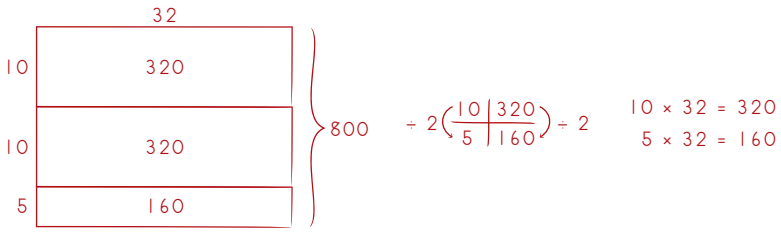
4 Begin the problem string with the first problem, 25 × 32. Allow time for students to think and record their work, and then solicit responses. Model student strategies on an open array and a ratio table.

Ron *I broke the 25 into 10, 10 and 5. Then I multiplied each of those by 32, so I got 320, 320 and 160. Then I added those together and got 800.*

Teacher *I'm curious. Can you tell us how you knew what 32 × 5 was?*

Ron *I already knew what 32 × 10 was, 320, so five 32s is just half as much, 160.*

Teacher *Ah, nice thinking. Let me model what I think you said. Can you look and see if I represented your thinking accurately?*



Ron *Yes, that looks like what I did.*

Teacher *OK. Tanner, can you tell us how you solved this one?*

Tanner *Sure. I thought about how we did a problem string the other day where we doubled and halved the numbers, so I actually made the problem be 100 × 8. That was way easier for me than 25 × 32.*

Teacher *Wow, I think so, too. Can you talk to us about that doubling and halving you just mentioned?*

Tanner *Yes. 25 × 32 is the same as 50 × 16.*

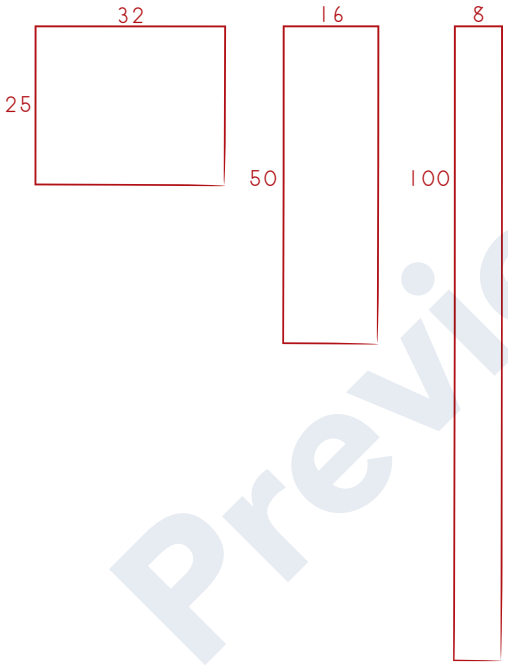
Teacher *I am going to interrupt you there. How do you know that?*

Tanner *Because I doubled one of the numbers and cut the other one in half. If you think about it, it's kind of like saying that 32 quarters are the same as sixteen 50 cent pieces.*

Teacher *Oh, I like that analogy.*

Tanner *So, that problem was better than the one you gave us, but I doubled and halved again to get 8 × 100. That's like $8.00! Easy.*

Teacher *Let's take a look at arrays for the problems you just mentioned.*



5 Continue the problem string by posing two more combinations, one at a time.

The second problem in the string involves multiplying 32 by ¼, and could be written ¼ × 32. However, it is very deliberately posed as ¼ of 32 to reinforce the meaning of multiplying a whole number by a fraction, as well as the connection between multiplication and division. To multiply 32 by ¼ is the same as dividing it by 4.

Problem String Multiplying Fractions, Decimals & Whole Numbers, Part 1

Problems	Sample Strategies & Recording	Connections
25 × 32	Model student responses as arrays and ratio tables.	See dialog above.
¼ of 32	Some students will likely divide 32 by 2 and then by 2 again, while others may simply divide 32 by 4. ÷ 2 (1 | 32) ÷ 2 — 1 × 32 = 32 ÷ 2 (½ | 16) ÷ 2 — ½ × 32 = 32 (¼ | 8) — ¼ × 32 = 32 32 ÷ 2 = 16 and 16 ÷ 2 = 8 *or* 32 ÷ 4 = 8	**Big Idea** Since 0.25 is the same as ¼, 0.25 × 32 is equivalent to finding one-fourth of 32, or dividing it by 4.
0.25 × 32	Look for a student who thought about the problem in terms of quarters, and another who applied the fact that 0.25 = ¼. Two possible approaches: 0.25 is a quarter of a dollar: × 2 (4 | $1) × 2 — 4 × 0.25 = $1.00 × 2 (8 | $2) × 2 — 8 × 0.25 = $2.00 × 2 (16 | $4) × 2 — 16 × 0.25 = $4.00 × 2 (32 | $8) × 2 — 32 × 0.25 = $8.00 0.25 = ¼ ¼ of 32 = 8, so 0.25 × 32 = 8	

6 After posing the first three problems, stop and ask students to consider the relationships among them.

Reiterate the connection between ¼ and 0.25. Then ask students to determine what, if any, relationship exists between the first problem and the two following.

> ***Teacher*** *Before we move on, I want to ask you something. I've noticed that the answers to the first three problems are 800, 8, and 8. I see the connection some of you made between the second and third problems, and I am wondering about a possible connection of those problems to the first one. Can someone talk about that?*
>
> ***Amber*** *The first problem was 25 × 32, and the third problem was 0.25 × 32, so I think there's definitely a connection.*
>
> ***Teacher*** *What relationship can we show between those?*
>
> ***Students*** *The 25 in the first problem is 100 times bigger than the 0.25.*
>
> *Yeah! And the 800 is 100 times bigger than the answer of 8.*
>
> *Or if you look at it the other way, 0.25 is smaller than 25.*
>
> ***Teacher*** *How much smaller?*
>
> ***Trevor*** *One-hundredth. So the answer of 8 is one-hundredth of 800!*

7 Continue the string with the next three problems: ¼ of 20, 0.25 × 20, and 25 × 20. Model students' thinking and again emphasize the relationships among the combinations.

Problem String Multiplying Fractions, Decimals & Whole Numbers, Part 2

Problems	Sample Strategies & Recording	Connections
¼ of 20	÷ 2 (1 | 20) ÷ 2 → 1 × 20 = 20 ÷ 2 (½ | 10) ÷ 2 → ½ × 20 = 10 (¼ | 5) → ¼ × 20 = 5 20 ÷ 2 = 10 and 10 ÷ 2 = 5 *or* 20 ÷ 4 = 5	**Big Idea** Since 0.25 is the same as ¼, 0.25 × 20 is equivalent to finding one-fourth of 20, or dividing it by 4. This result can be used to find 25 × 20, in that 25 is 100 times as much as 0.25, so the product of 25 × 20 will be 100 as much as 0.25 × 20, or 500.
0.25 × 20	0.25 = ¼ ¼ of 20 = 5 0.25 × 20 = 5	
25 × 20	Two possible approaches: 0.25 × 20 = 5 0.25 × 100 = 25, so 25 × 20 = 500 20 × 25 = 20 (25⁄100 × 100) = 20 (¼ × 100) = (20 × ¼) × 100 = (20 ÷ 4) × 100 = 5 × 100 = 500	
¼ of 1	One-fourth of 1 is 0.25 because ¼ is like a quarter. There are 4 quarters in a dollar, and one-quarter is 0.25.	Look for a variety of strategies to model, and watch to see how students apply the information from the previous six problems in the string. **Big Idea** Multiplying a number times ¼ is the same as finding ¼ of that number, or dividing it by 4.
¼ of 21	This problem can be approached directly: ÷ 2 (1 | 21) ÷ 2 → 1 × 21 = 21 ÷ 2 (½ | 10.5) ÷ 2 → ½ × 21 = 10.5 (¼ | 5.25) → ¼ × 21 = 5.25 21 ÷ 2 = 10.5 and 10.5 ÷ 2 = 5.25 *or* 21 ÷ 4 = 5.25	
	Some students will likely add the results of two previous problems, ¼ of 20 and ¼ of 1, to find ¼ of 21. 20 + 1 [20 | 5; 1 | 0.25; 21 | 5.25] 5 + 0.25 = 5.25 20 × ¼ = 5 1 × ¼ = 0.25 21 × ¼ = 5.25	

Assessment

Multiplication Work Sample

8 Let students know they will complete several more problems on their own. Display a copy of the Multiplication Work Sample Teacher Master, and tell students you will collect these papers in about 15 minutes and look them over later to see how they're doing with multiplying decimals and whole numbers.

- Pass out copies of the Multiplication Work Sample sheet.
- Review the instructions on the sheet with the class. When students understand what to do, have them start.
- After about 15 minutes, collect students' papers. At another time, review these work samples and use information provided in your Assessment Guide to help interpret students' work.

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

Work Places

Introducing Work Place 4B Multiplication Battle

9 Introduce the game Multiplication Battle.

- Display the Work Place 4B Multiplication Battle Record Sheet and give each student a copy.
- Explain that the game will help students practice using efficient strategies to multiply and divide 2- and 3-digit numbers.
- Tell students they will play the game as a team against you, and they will track the action for both teams on their copy of the record sheet as you do so at the projector.

10 Briefly summarize the game before playing against the class.

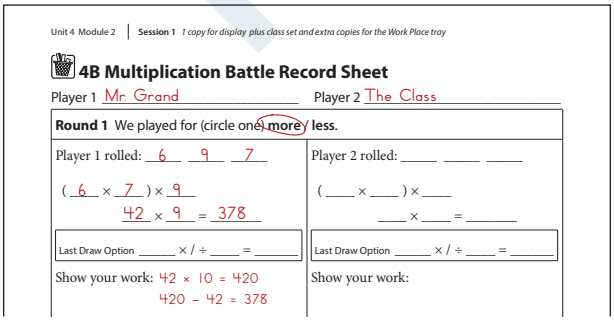
Players roll to determine whether they are playing for more or less. Then they take turns drawing Number Cards and multiplying the three numbers. Once the product is determined, the player has the option of drawing one more card from the deck and multiplying or dividing the original product by that number. The lower total wins if the partners rolled "less" at the start of the round; the higher total wins if they rolled "more" at the start of the round.

11 Invite a student volunteer to roll the more/less die, and ask students to circle the appropriate word at the top of the Round 1 box as you do so on the display.

12 Take the first turn as Player 1.

- Draw three cards from the deck you have prepared, and ask students to record your three numbers in the boxes as you do so on the display.
- Ask students to think about the order in which they would multiply these three numbers to make the computation as efficient as possible.
- Invite volunteers to explain why the combination they chose would be the easiest or most efficient.

When you record the order on the second line, review with students that you always perform the computation in parentheses first.



Unit 4 Module 2 | Session 1 *1 copy for display plus class set and extra copies for the Work Place tray*

4B Multiplication Battle Record Sheet

Player 1 Mr. Grand Player 2 The Class

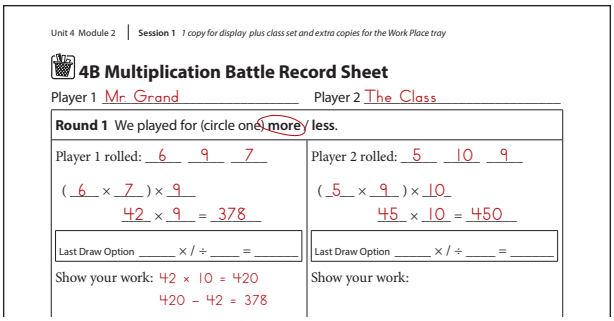
Round 1 We played for (circle one) **more** / **less**.

Player 1 rolled: 6 9 7	Player 2 rolled: ____ ____ ____
(6 × 7) × 9 42 × 9 = 378	(____ × ____) × ____ ____ × ____ = _____
Last Draw Option _____ × / ÷ ____ = _____	Last Draw Option _____ × / ÷ ____ = _____
Show your work: 42 × 10 = 420 420 − 42 = 378	Show your work:

- Have students complete the computation for you, and then ask a few to share their solutions and strategies.
- Record one student's methods in the "work space" section of the teacher's side, and write the answer on the line.

13 Repeat step 13 with the students, recording the results in the Round 1 box for Player 2 as they do so on their record sheets.

After the students' total is determined, compare the two sides and circle the winner.



Unit 4 Module 2 | Session 1 *1 copy for display plus class set and extra copies for the Work Place tray*

4B Multiplication Battle Record Sheet

Player 1 Mr. Grand Player 2 The Class

Round 1 We played for (circle one) more / less.

Player 1 rolled: 6 9 7	Player 2 rolled: 5 10 9
(6 × 7) × 9 42 × 9 = 378	(5 × 9) × 10 45 × 10 = 450
Last Draw Option ____ × / ÷ ____ = ____	Last Draw Option ____ × / ÷ ____ = ____
Show your work: 42 × 10 = 420 420 − 42 = 378	Show your work:

14 Play Round 2 with the class.

After students help determine your score for the second round, explain the Last Draw Option:

One or both players can elect to draw another card and multiply or divide their total by the number they get. Suspense is heightened if you require that the first player choose whether to take this option before the second player draws his or her cards.

Teacher *I'm not all that happy with a score of 350, especially since we're playing for less in this round. Lucky for me, there's a final step I can choose to take, and I'm going to take it. I can draw one more card from the top of the stack. Then I can multiply or divide my total by that number. … I got a 6. Should I multiply or divide my total by 6 if I want a smaller number?*

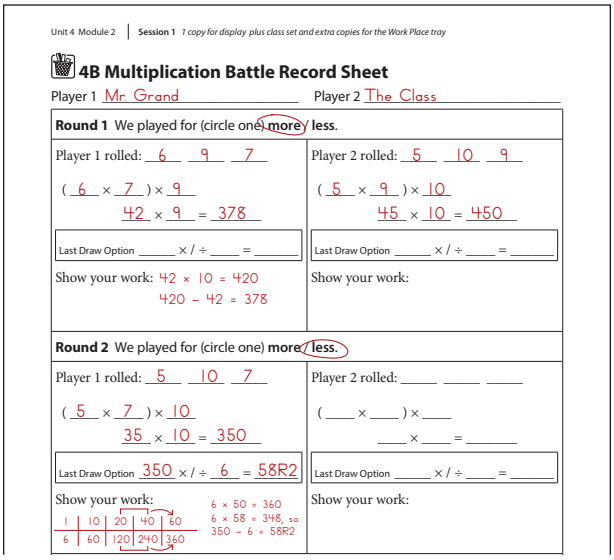
Students *Divide it, but you'll probably have a remainder. I don't think 6 will go evenly into 350.*

No, multiply it! That way, we'll win for sure, because 350 × 6 is close to 2,000.

Teacher *I think I'll divide so I can get a smaller total. Let's see. I think I'll start with a ratio table to get an idea of how many times I would have to multiply 6 to get close to 350. Ten times 6 is 60, double that is 120, and double that is 240. If I add 120 and 240, I'm just a little over 350 because 6 × 60 = 360. If I take 2 sets of 6 away, I'm down to 348, so 350 ÷ 6 would be 58 with 2 left over.*

Student *Hey, you just cut your score way down. Do we get to do the same thing on our turn?*

Teacher *Sure, but you'll probably want to see what your total is before you make your decision.*



Unit 4 Module 2 | Session 1 *1 copy for display plus class set and extra copies for the Work Place tray*

4B Multiplication Battle Record Sheet

Player 1 Mr. Grand Player 2 The Class

Round 1 We played for (circle one) more / less.

Player 1 rolled: 6 9 7	Player 2 rolled: 5 10 9
(6 × 7) × 9 42 × 9 = 378	(5 × 9) × 10 45 × 10 = 450
Last Draw Option ____ × / ÷ ____ = ____	Last Draw Option ____ × / ÷ ____ = ____
Show your work: 42 × 10 = 420 420 − 42 = 378	Show your work:

Round 2 We played for (circle one) more / less.

Player 1 rolled: 5 10 7	Player 2 rolled: ____ ____ ____
(5 × 7) × 10 35 × 10 = 350	(____ × ____) × ____ ____ × ____ = ____
Last Draw Option 350 × / ÷ 6 = 58R2	Last Draw Option ____ × / ÷ ____ = ____
Show your work: 1 | 10 | 20 | 40 | 60 6 | 60 | 120 | 240 | 360 6 × 50 = 360 6 × 58 = 348, so 350 − 6 = 58R2	Show your work:

15 Finish playing Rounds 2 and 3 with the Last Draw Option available to you and the class.

16 Wrap up today's session by asking giving students a few sets of numbers to order for multiplying. Explain that they don't need to solve the problem; they just need to think about what order would be the easiest. Then have them clean up and put away materials.

- $6 \times 7 \times 5$ (Sample answer: $(6 \times 5) \times 7$ because 6×5 gives a multiple of 10, which is easy to multiply.)
- $8 \times 9 \times 6$ (Sample answer $(8 \times 6) \times 9$ because you can multiply the product of the first two numbers by 10 and then take away one set.)
- $7 \times 8 \times 5$ (Sample answer $(7 \times 8) \times 5$ because you can multiply the product of the first two numbers by 10 and then cut the answer in half.)

Home Connection

17 Introduce and assign the Multiplication Strategies Home Connection, which provides more practice with the following skills:

- Multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between multiplication and division.(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)
- Multiply a whole number by a fraction (5.NF.4a)

Daily Practice

The optional Find the Product Student Book page provides additional opportunities to apply the following skills:

- Multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between multiplication and division (5.NBT.7)
- Multiply a whole number by a fraction (5.NF.4a)

Session 2
Callie's Charts

Summary

Students continue to consider the relationships between fractions, decimals, and whole numbers as they multiply various numbers by ¼, 0.25, 25 and ¾, 0.75, and 75 during a problem string. Next, they work first as a whole class and then individually or in pairs to solve some more problems related to Callie's fundraising efforts.

Skills & Concepts

- Multiply two 2-digit numbers using strategies based on place value and the properties of operations (4.NBT.5)
- Multiply decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)
- Use written numbers and symbols to represent strategies for computing with decimals to hundredths (5.NBT.7)
- Multiply a whole number by a fraction (5.NF.4a)
- 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 Multiplication Relationships		
		• student journals
Problems & Investigations Callie's Charts		
SB 122*–123 Callie's Soccer Cleats		
Daily Practice		
SB 124 Multiplication Battle		

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.*

Problem String

Multiplication Relationships

1 Open the session by explaining that today students will participate in a problem string. Then they'll solve some problems to help Callie in her efforts to raise enough money to buy soccer equipment.

2 Ask students to write today's date on a fresh page in their journals and title it Multiplication Relationships Problem String.

3 Deliver the problem string.

- Pose each problem one at a time by writing the combination on the board.
- Give students time to work in their journals.
- Solicit and record all answers to a given problem, and then invite one or two students to share how they solved the problem.
- Model students' strategies on open arrays or ratio tables.

Problem String Multiplication Relationships

Problems	Sample Strategies & Recording	Connections
¼ × 8	Most students will likely know the answer without having to do any computation in their journals, especially if they understand that ¼ × 8 is the same as one-fourth of 8, or 8 ÷ 4.	When you write the first combination on the board, review with students that ¼ × 8 means one-fourth of 8. **Big Idea** Finding ¾ of a number is the same as finding ¼ of that number and multiplying the results by 3 because ¾ = 3 × ¼. Since 0.75 is the same as ¾, multiplying a number by 0.75 is equivalent to finding ¼ of the number and multiplying the result. Another way to find the answer to 0.75 x *n* is to divide *n* by 4, and multiply the result by 3.
¾ of 8	Here, some students are likely to reason that if ¼ of 8 is 2, then ¾ of 8 is 6. You can reinforce this by recording a ratio table on the board similar to the one shown here. $\times\frac{1}{4}$: 1 → 8 ($\times\frac{1}{4}$) $\times 3$: $\frac{1}{4}$ → 2 ($\times 3$) $\frac{3}{4}$ → 6 $1 \times 21 = 21$ $\frac{1}{4} \times 21 = 10.5$ $\frac{3}{4} \times 21 = 5.25$	
0.75 × 8	Since 0.75 = ¾, the answer to this problem is the same as the one above: 6.	
75 × 9	Look for a student who was able to use the results of the previous problem to help solve this one. This would be a student who reasons that if 0.75 × 8 is 6, then 75 × 8 must be 600 because 75 is 100 times as much as 0.75. By adding one more set of 75 to 600, you have the answer to 75 × 9. $\times 100$: $0.75 \times 8 = 6$ → $75 \times 8 = 600$ ($\times 100$) $75 \times 1 = 75$ $75 \times 9 = 675$	**Big Idea** One strategy for multiplying by 75 is to find ¾ of at least part of the number, scale up, and work from there.
	Then compare the strategy with others the students are likely to share, such as using partial products. $75 \times 9 = (70 + 5) \times 9$ $= (70 \times 9) + (5 \times 9)$ $= 630 + 45 = 675$	
	Some students will likely multiply 75 by 10 and then subtract a group of 75 from the result. You can model this line of thinking on a ratio table. $\times 10$: 1 → 75 ($\times 10$) 10 → 750 -1: 9 → 657 (-75) $75 \times 1 = 75$ $75 \times 10 = 750$ $75 \times 9 = 675$	

Problems	Sample Strategies & Recording	Connections
¼ × 12	Most students will likely know the answer without having to do any computation in their journals, especially if they understand that ¼ × 12 is the same as one-fourth of 12, or 12 ÷ 4.	**Big Idea** Finding ¼ of a number is equivalent to multiplying that number by 0.25. If you have to multiply a number by 25, you might find ¼ of the number and scale it up by a factor of 100. Similarly, finding ¾ of a number is equivalent to multiplying that number by 0.75. If you have to multiply a number by 75, you might find ¼ of the number, multiply the results by 3 to get ¾ of the number, and then scale it up by a factor of 100.
¾ of 12	Look for a student to share who used ¼ of 12 to solve ¾ of 12.	
25 × 12	Look for a student who thought about the relationship of ¼, 0.25 and 25, and multiplied the answer to the first problem in this part of the string by 100. 0.25 × 12 = 3 → × 100 × 100 → 25 × 12 = 300	
75 × 12	Some students will likely use the results of the second problem in this part of the string (¾ of 12), scaling up by a factor of 100 to get 75 × 12. Others may simply multiply the results of the previous problem (25 × 12) by 3, reasoning that 75 is 3 times as much as 25. ¾ × 12 = 9 → × 100 ¾ = 0.75 × 100 → 75 × 12 = 900 75 × 12 = (3 × 25) × 12 = 3 x (25 × 12) = 3 × 300 = 900	
¾ of 14	Look for a student who found ¼ of 14 and then multiplied the result by 3 to find ¾ of 14. This line of thinking can be represented on a ratio table like the one here. ÷ 2: 1 → 14 ÷ 2 ÷ 2: ½ → 7 ÷ 2 ÷ 2: ¼ → 3.5 ÷ 2 × 3: ¾ → 10.5 × 3 1 × 14 = 14 ½ × 14 = 7 ¼ × 14 = 3.5 ¾ × 14 = 10.5 Look for a student who took a different approach to this problem, using the information that ¾ of 12 is 9, finding ¾ of 2, and adding the two to find ¾ of 14. ÷ 12: 12 → 9 ÷ 12 × 2: 1 → 0.75 × 2 × 2: 2 → 1.50 × 2 12 + 2 → 14 9 + 1.5 → 10.5	
75 × 14	Look for a student who used ¾ of 14 to solve this problem. ¾ is the same as 0.75, so ¾ of 14 = 0.75 × 14 0.75 × 14 = 10.5 100 x (0.75 × 14) = 10.5 × 100 75 × 14 = 1,050	

4 Summarize the "using quarters" strategy that has been emphasized in the problem string, and ask students to add an entry to the handbook section of their math journals, along with an example.

You may have your students suggest a name for the strategy or suggest the name "using quarters" yourself.

> ***Teacher*** *Throughout this problem string, we have seen people use the fractions ¼ and ¾ and the decimals 0.25 and 0.75 as a way to find the product of multiplication problems. What makes these numbers so friendly to work with?*
>
> ***Rosa*** *It's quarters! We use quarters all the time in money.*
>
> ***Teacher*** *What can we call this strategy of thinking about ¼ or ¾ of something, or multiplying by 0.25 or 0.75?*
>
> ***Sanjiv*** *Using quarters?*
>
> ***Teacher*** *That makes sense. Please add that multiplication strategy to your handbooks so you can refer back to it when you need to.*

Problems & Investigations

Callie's Charts

5 After the problem string, ask students to locate the Callie's Soccer Cleats Student Book page as you display your copy.

6 Review the directions, and then ask students to focus their attention on the first problem.

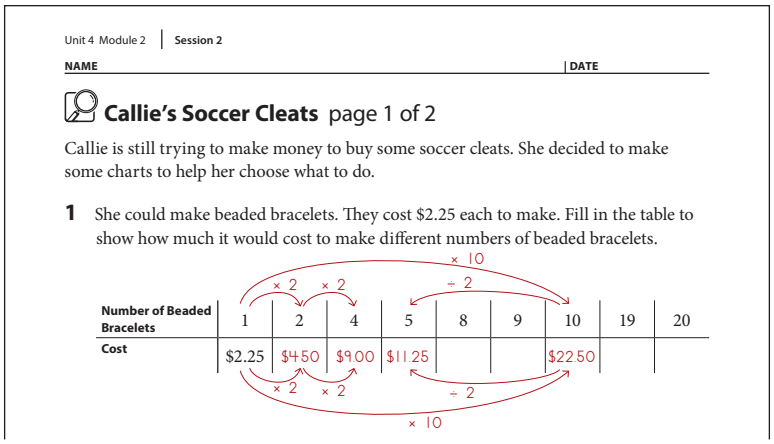
- Ask a volunteer to restate what is being asked in the problem.
- Ensure that students understand that each chart represents various numbers of bracelets that cost the same amount to make.

7 Work with input from the students to fill in some of the boxes on the chart at the top of the page.

- Be sure they understand that they don't have to fill in the boxes in order across the page. Instead, encourage them to find relationships that will help them solve the problems easily.
- For example, a student may suggest filling in the second box on the sheet by doubling the amount it costs to make 1 bracelet. Another student may suggest filling in the third box next because it's possible to double the amount it costs to make 2 bracelets to find the cost of making 4. A third student may propose multiplying the amount it costs to make 1 bracelet by 10, and using that information to determine how much it costs to make 5 bracelets and 9 bracelets.
- As you work with the students, following the order they propose and filling in the values with their help, be sure to label the chart with arrows to show the operations.
- Here is how the first chart on the page might look after you and the students have filled in 4 of the values, making optimal use of the relationships among the numbers in the top row.

Sample Dialog

You'll find sample dialog that illustrates how you might conduct this discussion among the Lesson Extras for this module in the Resources section of the Bridges Educator site.



Unit 4 Module 2 | Session 2

NAME | DATE

Callie's Soccer Cleats page 1 of 2

Callie is still trying to make money to buy some soccer cleats. She decided to make some charts to help her choose what to do.

1 She could make beaded bracelets. They cost $2.25 each to make. Fill in the table to show how much it would cost to make different numbers of beaded bracelets.

Number of Beaded Bracelets	1	2	4	5	8	9	10	19	20
Cost	$2.25	$4.50	$9.00	$11.25			$22.50		

× 2 × 2 × 10 ÷ 2 ÷ 2 × 2 × 2 × 10

8 Once students understand the task, set them to work completing the rest of the assignment. As they work, circulate to answer questions and observe strategies students are using.

SUPPORT Pair struggling students with a partner who is stronger but still challenged by the task to allow them the opportunity to talk out relationships between the numbers listed in the chart.

ELL Ensure that students understand vocabulary related to the sales context of the problems.

CHALLENGE Ask students to look for patterns in the table and efficient ways to fill it in. Ask them to explain to a partner the order they chose and what prompted them to do so. Is the order they chose always the most efficient?

9 Close the session.

- Let students know they will discuss strategies for completing the ratio table in the following session.
- Pose a few problems similar to those in the string: ¼ of 16, 0.25 × 16, and 25 × 16. Invite a student to discuss the connection between the problems.

Daily Practice

The optional Multiplication Battle Student Book page provides additional opportunities to apply the following skills:

- Multiply a 2-digit whole number by a 1-digit whole number using strategies based on place value and the properties of operations (4.NBT.5)
- Write and evaluate numerical expressions with parentheses (5.OA.1)
- Round decimals to the nearest ten, one, tenth, and hundredth (5.NBT.4)

Session 3
Callie's Ratio Tables

Summary

Students participate in a multiplication string that emphasizes the use of fractions as operators and reinforces the connection between ¼ and 0.25. Then, students share strategies for filling in the ratio tables they worked with last session. The class discusses the use of ratio tables to represent both multiplication and division equations, and students work on the More Planning for Callie Student Book page. Finally, the teacher introduces the Dante's Decision Home Connection.

Skills & Concepts

- Multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between multiplication and division (5.NBT.7)
- Use written numbers and symbols to represent strategies for computing with decimals to hundredths (5.NBT.7)
- Multiply a whole number by a fraction (5.NF.4a)
- 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 Fractions as Operators		
		• student journals
Problems & Investigations Callie's Ratio Tables		
SB 125*–127 More Planning for Callie		• Callie's Soccer Cleats (SB 122, completed in Session 2) • student whiteboards, markers, and erasers (class set)
Home Connection		
HC 73–74 Dante's Decision		
Daily Practice		
SB 128 With or Without		

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

Preparation

You will need 4 blank copies of the Callie's Soccer Cleats Student Book page from the previous session on which to record students' thinking. Alternatively, you can lay a blank overhead transparency over a single copy of the sheet and move the transparency as needed.

Problem String

Fractions as Operators

1 Open the session by explaining that students will participate in a multiplication problem string. Then the class will discuss their work on ratio tables from the previous session and students will complete a related assignment in their Student Books.

2 Ask students to write today's date on a fresh page in their journals and title it Fractions as Operators Problem String.

3 Deliver the problem string.

- Pose each problem one at a time by writing the combination on the board.
- Give students time to work in their journals.
- Solicit and record all answers to a given problem, and then invite one or two students to share how they solved the problem.
- Model students' strategies on open arrays or ratio tables, and keep the relationships among fractions, decimals, and whole numbers in the forefront.

Problem String Fractions as Operators

Problems	Sample Strategies & Recording	Connections
0.25×8	Strategies students might suggest for solving this problem include thinking in terms of 8 quarters or thinking of 0.25 as ¼, and cutting 8 in half once and then once again. Both strategies can be modeled on ratio tables. ×4 ×2: 1 | 4 | 8; 0.25 | 1 | 2 $0.25 \times 1 = 0.25$ $0.25 \times 4 = 1$ $0.25 \times 8 = 2$ ÷2 ÷2: 1 | ½ | ¼; 8 | 4 | 2 $8 \times 1 = 8$ $8 \times \frac{1}{2} = 4$ $8 \times \frac{1}{4} = 2$	By now, many of your students will likely see and understand the connection between ¼, 0.25, and 25. Emphasize these relationships by finding individuals who use them to solve the problems in this string.
26×8	Look for a student who used the results of the previous problem to solve this one, reasoning that if 0.25×8 is 2, then 25×8 must be 200, and 26×8 would be 200 + 8, or 208. ×100 (25 + 1): 0.25 | 25 | 1 | 26; 2 | 200 | 8 | 208; ×100 (200 + 8)	
0.26×8	Some students may suggest using the results of the previous problem and dividing them by 100 to reflect the fact that 0.26 is 100 times smaller than 26. ÷100: 26 | 0.26; 208 | 2.08; ÷100 You can also challenge students to think about how they might use the results of the first problem in the string (0.25×8) to help solve this one. ×0.25 (1 | 8) ×0.25; 0.25 + 0.01: 0.25 | 2; 2 + 0.08: 0.01 | 0.08; 0.26 | 2.08	

Problems	Sample Strategies & Recording	Connections
25 × 84	Look for a student who is able to use the relationship between 25 and ¼ to solve this problem. × 0.25: 1 | 84 → × 0.25 × 100: 0.25 | 21 → × 100 25 | 2,100 At least one student might also suggest finding the product of 100 × 84 and then dividing the result by 4 because 25 is one-fourth of 100: 100 × 84 = 8,400 8,400 ÷ 4 = 2,100	**Big Idea** When multiplying a number by 25, one can find ¼ of the number and then scale up by a factor of 100 since 25 is 100 times as much as 0.25. Presented as a series of equations, you can see the commutative and associative properties at work. 25 × 84 = (25/100 × 100) × 84 = (¼ × 100) × 84 = (100 × ¼) × 84 = 100 x (¼ × 84) = 100 × 21 = 2,100
0.25 × 84	At least a few students will likely use the results of the previous combination, reasoning that if 25 × 84 is 2,100 then 0.25 × 84 must be one-hundredth of 2,100 or 21. Others may think about 0.25 as ¼, and cut 84 into 4 equal pieces, arriving at an answer of 21. This can be represented with one or more of the equations below: ¼ × 84 = 21 84 ÷ 4 = 21 84 ÷ 2 = 42 and 42 ÷ 2 = 21	**Big Idea** Multiplying a number by 0.25 is the same as multiplying that number by ¼. Because multiplying a number by ¼ involves finding one-fourth of that number, multiplying a number by 0.25 is the same as dividing it by 4.
0.25 × 23	Look for a student to share who connected 0.25 to ¼, and used the connection to solve the problem by finding ¼ of 23. ÷ 2: 1 | 23 → ÷ 2 — 1 × 23 = 23 ÷ 2: 0.5 | 11.5 → ÷ 2 — 0.5 × 23 = 11.5 0.25 | 5.75 — 0.25 × 23 = 5.75	

Problems & Investigations

Callie's Ratio Tables

4 Have students put away their journals. Display your copy of the Callie's Soccer Cleats Student Book page from the previous session and have students locate their completed pages.

5 Ask a volunteer to remind the class of the context for the ratio tables on the page. Then allow students a few minutes to turn and talk with a partner about the order in which they filled in the ratio table for the first problem.

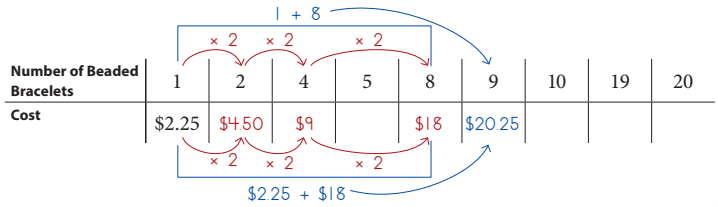
Although some students may have chosen to fill in each ratio table from left to right, a more efficient strategy is to fill in numbers of bracelets that are easy to solve mentally, and then use those amounts to determine the harder multiplication problems.

- As pairs of students are discussing their thinking, look for students who used efficient methods to find the cost of 9 and 19 bracelets.
- When listening to students' conversations, ask students to justify the order in which they chose to fill in the table.

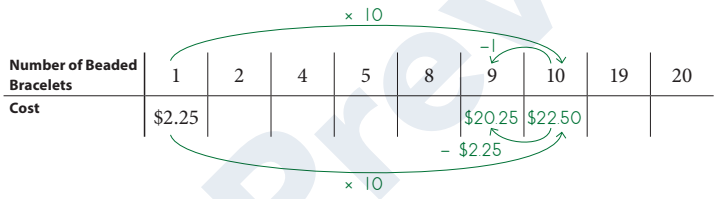
6 Facilitate a conversation about strategies for determining the cost of 9 beaded bracelets in the first problem. Look for a student to share who built up to 9 bracelets by adding the cost of 4 and 5 or 8 and 1 bracelets and one student who used the cost of 10 bracelets to determine the cost of 9.

As students share, record their thinking on blank copies of the Callie's Soccer Cleats Student Book page.

> ***Teacher*** *Yesterday, you found out how much it would cost Callie to make different numbers of beaded bracelets. I'm interested in hearing how some of you figured out the cost for 9 bracelets, especially since the table didn't build up 1 bracelet at a time. Monica, will you tell us about your thinking please?*
>
> ***Monica*** *Sure. We know that 1 beaded bracelet costs $2.25 already, so I doubled that and found that 2 bracelets would cost $4.50. Then I doubled again to find that 4 bracelets cost $9. And I doubled again to find that 8 bracelets cost $18. Then, since I knew that 8 bracelets cost $18, and 1 bracelet cost $2.25, I just added those together.*



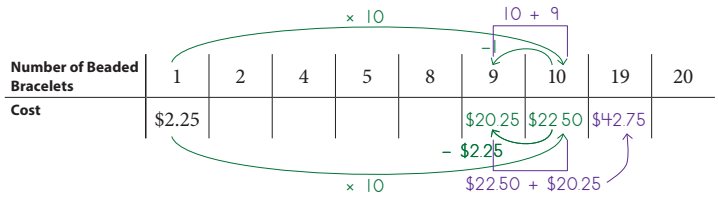
> ***Teacher*** *How is that like what you did, Asa?*
>
> ***Asa*** *I also used some pieces to get to 9, but the pieces I used were different.*
>
> ***Teacher*** *Tell us what you did.*
>
> ***Asa*** *The ratio table already had the cost for 1 bracelet, $2.25. So I multiplied by 10 to get 10 bracelets for $22.50. Then to get 9 bracelets, I subtracted 1 bracelet and $2.25 to get to $20.25.*



7 Facilitate a conversation about strategies for determining the cost of 19 beaded bracelets in the first problem. Look for a student to share who built up to 19 bracelets by adding the cost of making two or more of the other quantities (e.g. 9 and 10), and look for another student who used the cost of 20 bracelets to determine the cost of 19.

As students share, continue to record their thinking on fresh copies of the Callie's Soccer Cleats Student Book page.

> ***Teacher*** *Sue Lynn, 19 beaded bracelets seems like an unfriendly multiplication problem. Can you please tell us how you figured that one out?*
>
> ***Sue Lynn*** *I had already solved the cost of 9 bracelets and 10 bracelets exactly like Asa did, so I just added those amounts together to find the cost of 19 bracelets.*
>
> ***Teacher*** *How helpful to have those amounts of bracelets already done!*



Teacher *Raul? Can you think of another way that we could easily find the cost of 19 bracelets?*

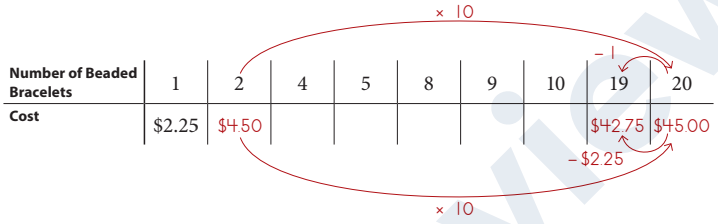
Raul *Sure! The first thing I wanted to do was to get to 20 bracelets, and then I knew I could just subtract the cost of 1 bracelet and that would give me the answer to 19 bracelets.*

Teacher *And how could you find the cost of 20 bracelets?*

Raul *Lots of ways, actually. You could add a bunch of bracelets together, you could find the cost of 10 bracelets and double it, you could…*

Teacher *Tell us what you decided to do, please.*

Raul *I went from 1 bracelet to 2 by doubling the cost and got $4.50. Then, I multiplied by 10 to go from 2 bracelets to 20 and found out that they would cost $45. Then all I needed to do was subtract 1 bracelet that cost $2.25 to get my answer, $42.75.*



8 Ask students to turn and talk to a partner about the strategies they used to fill in the cost of different quantities of woven bracelets in the third problem.

- As pairs of students are discussing their thinking, look for individuals who used efficient methods to find the cost of 15, 49, and 99 bracelets.
- When listening to students' conversations, ask students to justify the order they chose to fill in the table.

9 Facilitate a conversation about efficient strategies for filling in the cost of 15, 49, and 99 bracelets. Model students' thinking by representing relationships on the display copy of Callie's Soccer Cleats Student Book page.

Because the discussion emphasizes efficiency and the use of strategies students have explored in previous problem strings, the following are suggestions of strategies to bring out in the class conversation.

- For the cost of 15 bracelets, look for students who found the cost of 10 bracelets, halved the cost to determine the cost of 5 bracelets, then added the two costs together.
- For the cost of 49 bracelets, look for students who found the cost of 50 bracelets and then subtracted the cost of 1 bracelet.
- For the cost of 99 bracelets, look for students who found the cost of 100 bracelets and then subtracted the cost of 1 bracelet.

10 After sharing strategies for filling in the ratio tables on the Callie's Soccer Cleats Student Book page, ask students to record equations to represent some of the information on the tables.

- Have helpers pass out whiteboards, markers, and erasers.
- Remind students that ratio tables are a shorthand way to notate mathematical relationships, and that each entry can be represented with an equation.
- Have students use their Callie's Soccer Cleats page for reference. (You can also leave the most complete copy of one of the sheets you filled in during the discussion on display, or borrow a completed sheet from one of the students to display for everyone's reference.)
- Pose the following problems, all of which have already been solved, and ask students to record a multiplication or division equation to represent each.
  - » How much will it cost Callie to make 8 beaded bracelets? ($8 \times \$2.25 = \$18$)
  - » How much will it cost Callie to make 9 woven bracelets? ($9 \times \$1.20 = \$10.80$)
  - » If Callie has $11.25 to make beaded bracelets, how many can she make? ($\$11.25 \div \$2.25 = 5$)
  - » If Callie has $60.00 to make woven bracelets, how many can she make? ($\$60.00 \div \$1.20 = 50$)
  - » If Callie took in $35.00 from the sale of beaded bracelets, how many bracelets did she sell? ($\$35.00 \div \$3.50 = 10$)
  - » If Callie took in $148.50 from the sale of woven bracelets, how many bracelets did she sell? ($\$148.50 \div \$1.50 = 10$)

CHALLENGE The problems above are just examples of some of the many that might be posed about the information on the ratio tables. You might invite students to take turns posing other problems about the ratio tables for their classmates to represent with equations.

11 Ask students to find the first More Planning for Callie Student Book page and display your copy. Ask students to turn and talk to a partner about the similarities and differences between this assignment and the one they completed in the previous session.

- Review the ratio tables on the pages and note with students that some of the missing information on the ratio tables relates to the numbers of bracelets or cake pops, while some relates to the amount of money it would cost to make them or the amount of money Callie would get by selling them.
- When students understand what to do, give them the remainder of the session to complete the page.
- Circulate while students work to answer questions and provide scaffolding as needed.

CHALLENGE Invite students who complete the assignment easily and accurately to tackle the challenge problem on the last page of the assignment. Be sure they understand that Callie wants to make a *profit* of $100 or more from the sales. That is, she wants to make that amount over and above what it costs her to make the bracelets in the first place.

SUPPORT If some students aren't able to complete the assignment in the allotted time, consider having them complete the pages as homework rather than assigning them the regular Home Connection.

12 Close the session.

Let students know that they will take a checkpoint next session so you and they can gauge their progress with the skills and concepts addressed so far in this unit.

Home Connection

13 Introduce and assign the Dante's Decision 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)
- Use >, =, and < symbols to record comparisons of two decimals to thousandths (5.NBT.3b)
- Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)
- Use written numbers and symbols to represent strategies for computing with decimals to hundredths (5.NBT.7)

Daily Practice

The optional With or Without Student Book page provides additional opportunities to apply the following skills:

- Multiply decimals to hundredths, using concrete models or drawings and strategies based on place value and properties of operations (5.NBT.7)
- Use written numbers and symbols to represent strategies for computing with decimals to hundredths (5.NBT.7)

Session 4
Over & Under

Summary

Students begin this session by taking the Multiplication & Division Checkpoint. Then they work on an assignment in their Student Books in which they solve multiplication problems using relationships between fractions, decimals, and whole numbers. Toward the end of the session, the teacher reconvenes the class to share and discuss strategies.

Skills & Concepts

- Multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between multiplication and division (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)
- Reason abstractly and quantitatively (5.MP.2)
- Look for and make use of structure (5.MP.7)
- Look for and express regularity in repeated reasoning (5.MP.8)

Materials

Copies	Kit Materials	Classroom Materials
Assessment Multiplication & Division Checkpoint		
TM T4 Multiplication & Division Checkpoint		
Problems & Investigations Over & Under		
SB 129* Over & Under		
Daily Practice		
SB 130 Making Cupcakes		

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.*

Assessment

Multiplication & Division Checkpoint

1 Open the session by telling students they will take a quick checkpoint on multiplication and division. Then they will use what they know about the relationships between fractions, decimals, and whole numbers to solve some multiplication problems.

2 Display the Rounding & Multi-Digit Addition Checkpoint and give each student a copy. Give students a minute to look it over, ask questions, and then have them begin.

- 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 15 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.

Note Today's Daily Practice sheet is very similar to the Multiplication & Division Checkpoint and can be used to check some students' progress after remediation, if necessary.

Assessment Guide

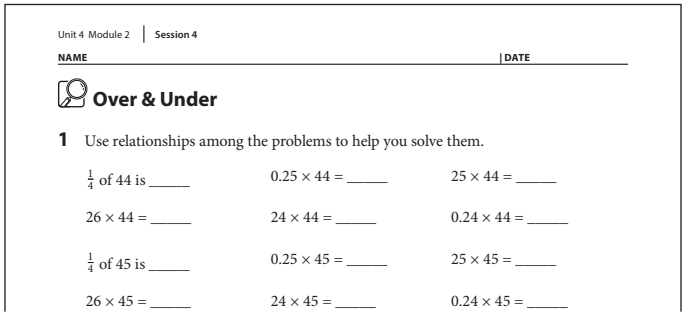
See the Grade 5 Assessment Guide for scoring and intervention suggestions.

Problems & Investigations

Over & Under

4 Have students find the Over & Under Student Book page as you display a copy.

5 Ask students to look over the first set of problems but, rather than solving the problems immediately, ask them to tell you what relationships they notice.



Unit 4 Module 2 | Session 4

NAME _____ DATE _____

Over & Under

1 Use relationships among the problems to help you solve them.

$\frac{1}{4}$ of 44 is _____	0.25 × 44 = _____	25 × 44 = _____
26 × 44 = _____	24 × 44 = _____	0.24 × 44 = _____
$\frac{1}{4}$ of 45 is _____	0.25 × 45 = _____	25 × 45 = _____
26 × 45 = _____	24 × 45 = _____	0.24 × 45 = _____

Use questions such as the following to spark students' thinking if necessary.

- What relationships do you see among the problems?
- How might you use the relationships to help solve the problems?

> ***Students*** *I see a lot of 25s and ¼s and 0.25s.*
>
> *I also see 25 × 24, then 26 × 24 and 24 × 24. You're multiplying 24 in all of those, and the numbers are really close. Like if you figured out 25 times 24, it would be easy to do the others.*

It's going to be hard to figure out ¼ of 45, because you can't divide 45 by 4.

I respectfully disagree with you, DJ. If you know what ¼ of 44 is, you can just add another one-fourth to the answer for that one.

I think there are a lot of helper problems on this page.

Teacher *Let's see if you can put those relationships to work as you find efficient ways to solve these problems.*

6 Have students begin work on the page. As students work, circulate and ask scaffolding questions.

- Can you use an earlier problem to help you?
- How is ¼ related to 0.25? To 25?
- If you know the answer to ¼ of a number, how does that help you find 0.25 × that number?
- If you know ¼ of a number, how does that help you find 25 × that number?
- To find ¾ of a number, how can you use ¼ of that number?

SUPPORT Examine the problem sets with students. After solving one problem in a set, discuss its relationship to another problem in the same set and work with students to verbalize how changing the numbers in the problem will change the product.

CHALLENGE Invite students who finish the first two sets of problems on the sheet easily and accurately to solve the third problem set at the bottom of the sheet.

CHALLENGE Ask students to partner with another student and discuss the order in which they solved the problems. Ask them to verbalize a "path" they could take that minimizes the amount of work to solve one or both sets of problems.

7 When most students have finished at least the first problem set, if not the entire assignment, reconvene the class and invite volunteers to explain how they used ¼ of 44 to find ¼ of 45, and how they used the results to find 25 × 45.

Sally *Since I know that ¼ of 44 is 11, I just have to think about ¼ of 1 more. One-fourth of 1 is easy—that's a quarter, 0.25. So ¼ of 45 is 11.25.*

Teacher *How could you use that to find 25 × 45?*

Students *Since 0.25 × 45 = ¼ of 45 = 11.25 and I know that 100 times 0.25 is 25, then 25 × 45 is 100 times 11.25. That's 1,125.*

I see how you can do it that way, but I also think you could use doubling and halving. Half of 45 is 22.5 and half of 22.5 is 11.25. So 25 × 45 = 50 × 22.5 = 100 × 11.25. Either way, you need to multiply 11.25 by 100.

8 Then invite volunteers to describe how they used the first nine problems in Set 1 to solve the last three: 26 × 45, 24 × 45, and 0.24 × 45.

Teacher *How did you use an earlier problem to find 26 × 45?*

Suki *I already knew that 25 × 45 is 1,125. So 1 more 45 is 1,125 + 45 = 1,170.*

Teacher *And how about 24 × 45?*

Students *It's just one less group of 45 than 1,125.*

Or two groups of 45 less than 1,170.

Either way, it's 1,080.

Teacher *How did you use a previous problem to find 0.24 × 45?*

Ebony *That's easy. Since we already knew 24 × 45 = 1,080, the product of ¹⁄₁₀₀ of 24 × 25 has to be ¹⁄₁₀₀ of 1,080. I had to think about that. ¹⁄₁₀ of 1,080 is 108. So, ¹⁄₁₀₀ of 1,080 is 10.8.*

9 Next, invite volunteers to share how they used the first six problems in Set 2 to help solve the last six, all of which revolve around finding ¾ of 33 and other closely related combinations.

> ***Teacher*** *How did you use the answers to the first few problems in the second set to help figure out ¾ of 33?*
>
> ***Students*** *That was hard. You can't divide 33 by 4 and come out even.*
>
> *I used the first problem to help. It was easy to figure out ¼ of 32 because you can just cut it in half and then in half again.*
>
> *Since ¼ of 32 is 8, then ¾ of 32 is 24. I still needed ¾ of 1 and that's just 0.75. So ¾ of 33 is 24.75.*
>
> *Then you can multiply that by 100 to get 75 × 33. It's just 2,475.*
>
> *I did something kind of like you did, Allison, but I just got ¾ of 33 by finding ¼ of 32 and ¼ of 1. That's 8 + 0.25. Then I scaled up by 3 because you have to get three-fourths of 33, not one-fourth. 3× 8 is 24 and 3 × 0.25 is 0.75. So 24.75. Then I multiplied by 100, too.*

CHALLENGE If you have time, invite volunteers to describe how they used the problems in the first two sets to help solve some of the combinations in the last (challenge) set.

10 Press students to make some generalizations about the relationships they used and how they used them.

Here are some questions you might find helpful:

- What did these problems have in common?
- How are the fraction problems related to the decimal problems?
- How are the decimal problems related to the whole number problems?
- How can you use the results of 25 × 45 to help get the answer to 26 × 45? Do you need to add an extra set of 25, 26, or 45? How do you know?
- How might these relationships help you solve other problems?
- What kinds of numbers might work well for similar fraction strategies?

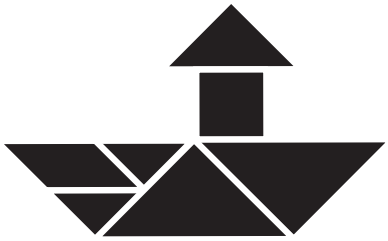
11 End the session by having students turn and talk to a partner about how they would explain to a new student in class how to use the relationships to solve similar problems.

Invite a few students to share their explanations if time permits.

Daily Practice

The optional Making Cupcakes Student Book page provides additional opportunities to apply the following skills:

- Multiply two 2-digit numbers using strategies based on place value and the properties of operations (4.NBT.5)
- Divide a 3-digit whole number by a 2-digit whole number using strategies based on place value, the properties of operations, or the relationship between multiplication and division (5.NBT.6)
- Multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between multiplication and division (5.NBT.7)



Teacher Masters

GRADE 5 – UNIT 4 – MODULE 2

BRIDGES™
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Multiplication Work Sample

Callie's neighbor offered to take some of Callie's cake pops to sell to her friends.

1 Callie made 24 cake pops for her neighbor. If it costs $1.25 to make one cake pop, how much did it cost to make 24 of them? Show your work.

2 The neighbor sold 16 cake pops for $1.75 each. How much money did the neighbor collect? Show your work.

3 How many more cake pops does the neighbor need to sell so that Callie can make a profit of $5.00? Show your work.

Work Place Guide 4B Multiplication Battle

Summary

Players roll to determine whether they are playing for more or less. Then players take turns drawing Number Cards and multiplying the three numbers. Once the product is determined, the player has the option of drawing one more card from the deck and multiplying or dividing the original product by that number. The lower total wins if the partners rolled "less" at the start of the round; the higher total wins if they rolled "more" at the start of the round.

Skills & Concepts

- Write and evaluate numerical expressions with parentheses (5.OA.1)
- Multiply a 2- or 3-digit whole number by a 1-digit whole number using strategies based on place value and the properties of operations (4.NBT.5)
- Divide a 2- or 3-digit whole number by a 1- or 2-digit whole number using strategies based on place value, the properties of operations, or the relationship between multiplication and division (5.NBT.6)

Materials

Copies	Kit Materials	Classroom Materials
TM T2 Work Place Guide 4B Multiplication Battle **TM T3** 4B Multiplication Battle Record Sheet **SB 119–120** Work Place Instructions 4B Multiplication Battle	• 1 deck of Number Cards • 1 more/less cube	• scratch paper available

Assessment & Differentiation

If you see that . . .	Differentiate	Example
A student needs help developing efficient strategies.	SUPPORT Pull together several students and play a small-group version of the game. Model and share your own thinking and encourage students to help one another as you play. Emphasize the order of the numbers. Allow students to use paper and pencil to solve problems if that helps. Have students analyze the numbers before they multiply; how can they combine the three numbers they drew to make the easiest combination? Invite the student to play Game Variation A or B until she becomes more comfortable with the game or the computation involved.	A student has to multiply 8, 7, and 7. Ask which two numbers it would be simplest to multiply first. Help the whole group see that multiplying 7×7 first gives them 49, making it possible to multiply 8 by 50 and then subtract a group of 8 to get the answer.
A student is very proficient at 1-digit-by-2-digit multiplication.	CHALLENGE Have students work with 2-digit numbers by drawing 4 cards from the deck and combining two of them to make a 2-digit number. Challenge these students to make optimal use of the numbers and any strategies they can deploy to create combinations they can solve mentally. The challenge is to work larger combinations mentally, rather than resorting to paper and pencil. CHALLENGE Encourage students to use Game Variation C.	A student draws a 5, a 10, a 7, and an 8. Perhaps he decides to combine the 8 and the 7 to make 87, and records $(87 \times 10) \times 5$. This yields 870×5, and can be solved mentally using the Half-Tens facts: $870 \times 10 = 8{,}700$; 5 is half of 10, so he must cut the product in half to get 4,350.

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

- Play a game with ELL students to help them understand the directions. Use explicit modeling and recording.
- Allow students to play in their own language if they have a peer who shares their native language.
- If students are struggling with multiplication strategies, have them play with, rather than against, a partner. Have them think about which strategies lend themselves to certain numbers. Make sure handbooks, Word Resource Cards, and posters are available for reference.

4B Multiplication Battle Record Sheet

Player 1 _____ Player 2 _____

Round 1 We played for (circle one) **more** / **less**.

Player 1	Player 2
Player 1 rolled: _____ _____ _____	Player 2 rolled: _____ _____ _____
(_____ × _____) × _____	(_____ × _____) × _____
_____ × _____ = _____	_____ × _____ = _____
Last Draw Option _____ × / ÷ _____ = _____	Last Draw Option _____ × / ÷ _____ = _____
Show your work:	Show your work:

Round 2 We played for (circle one) **more** / **less**.

Player 1	Player 2
Player 1 rolled: _____ _____ _____	Player 2 rolled: _____ _____ _____
(_____ × _____) × _____	(_____ × _____) × _____
_____ × _____ = _____	_____ × _____ = _____
Last Draw Option _____ × / ÷ _____ = _____	Last Draw Option _____ × / ÷ _____ = _____
Show your work:	Show your work:

Round 3 We played for (circle one) **more** / **less**.

Player 1	Player 2
Player 1 rolled: _____ _____ _____	Player 2 rolled: _____ _____ _____
(_____ × _____) × _____	(_____ × _____) × _____
_____ × _____ = _____	_____ × _____ = _____
Last Draw Option _____ × / ÷ _____ = _____	Last Draw Option _____ × / ÷ _____ = _____
Show your work:	Show your work:

NAME | **DATE**

Multiplication & Division Checkpoint

1 A woven necklace costs $2.40 to make. Fill in the table to show how much it would cost to make 16 woven necklaces.

Note You don't need to use all the boxes in this table or the other one below. Just use as many as you need and leave the rest.

Number of Woven Necklaces	1								
Cost	$2.40								

It would cost _____ to make 16 woven necklaces.

2 How many woven necklaces could you make for $120.00? Fill in the table to solve the problem.

Number of Woven Necklaces	1								
Cost	$2.40								

You could make _____ woven necklaces for $120.00.

3 Find 23 × 99, using the most efficient strategy you can. Show your work.

4 Find 2,323 ÷ 23, using the most efficient strategy you can. Show your work.

Student Book

GRADE 5 – UNIT 4 – MODULE 2

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Work Place Instructions 4B Multiplication Battle page 1 of 2

Each pair of players needs:

- 1 4B Multiplication Battle Record Sheet
- 1 deck of Number Cards (remove the 0s, 1s, and wild cards)
- 1 more/less die
- pencils

1 Players work together to remove the 0s, 1s, and wild cards from the deck and set them aside. Then they shuffle the remaining cards and place them in a stack, face-down, between them.

2 Each player draws a card from the stack. The player with the higher number goes first.

3 Players should place the cards they just drew at the bottom of the stack for use during the game.

4 Player 1 rolls the more/less die to see whether more or less is the goal, and then circles the word on the record sheet.

5 Player 1 draws three cards from the top of the stack, records the numbers on the record sheet, and thinks about the best order for multiplying these three numbers.

It may help to move the cards around.

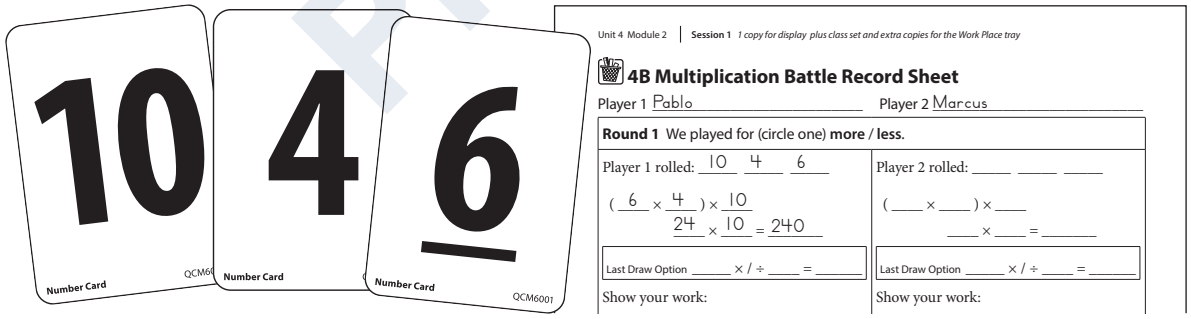
6 Player 1 writes an expression to show the order to multiply the numbers.

The two numbers that will be multiplied first are written in parentheses, with the third number outside the parentheses.

7 Player 1 multiplies the first two numbers inside the parentheses and write the product, along with the third number, on the next line.

8 Player 1 finds and records the product, using the work space to do any figuring if necessary.

If Player 2 does not agree with the answer, Player 1 must record his thinking in the work space to prove that he is correct (or make corrections if he is not.)



Pablo *I can just do this one in my head. That's why I multiplied the 6 × 4 first, because any number times 10 is really easy.*

9 The Last Draw Option: If a player is not happy with his total, he can choose to draw one more card from the top of the stack and then multiply or divide the total by that number.

He can do the work in his head if he likes, but if Player 2 does not agree with the answer, Player 1 must record his thinking in the work space to prove that he is correct (or make corrections if he is not.)

Work Place Instructions 4B Multiplication Battle page 2 of 2

10 Player 2 takes a turn drawing three cards, finding the product, and exercising the Last Draw Option if she chooses to do so.

11 Players compare their totals and circle the winner.

The lower total wins if players rolled "less" at the start of the round. The higher total wins if they rolled "more" at the start of the round.

12 Players begin a new round. Best out of three rounds wins the game.

Game Variations

A Start with a whole deck. Remove the 0s, 7s, 8s, 9s, and wild cards so you're playing the game with 1s, 2s, 3s, 4s, 5s, 6s, and 10s.

B Eliminate the Last Draw Option for fewer steps and less computation.

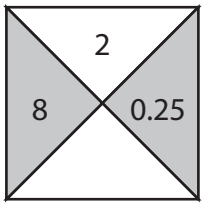
C Leave the deck set up as instructed in the first step on the previous page, but put the wild cards back in and shuffle the deck thoroughly. If a player draws a wild card, she can assign it any value between 11 and 20, even if she draws it for the Last Draw Option. She must write the assigned value on one of the lines, just as if she had drawn that number from the stack of cards.

NAME | DATE

Find the Product

1 Complete the box challenges.

a



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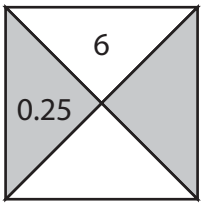
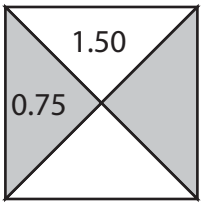
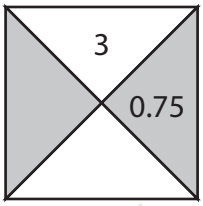


c



d



2 Find the product.

a $\frac{1}{5}$ of 20

b $\frac{1}{3}$ of 18

c $\frac{4}{5}$ of 20

d $\frac{2}{3}$ of 18

e $\frac{1}{6}$ of 30

f $\frac{1}{15}$ of 60

g $\frac{5}{6}$ of 30

h $\frac{2}{15}$ of 60

3 Brooke and Kaden each sold 15 boxes of cookies for $2.25 per box. How much money did they collect together? Show your work.

NAME | DATE

Callie's Soccer Cleats page 1 of 2

Callie is still trying to make money to buy some soccer cleats. She decided to make some charts to help her choose what to do.

1 She could make beaded bracelets. They cost $2.25 each to make. Fill in the table to show how much it would cost to make different numbers of beaded bracelets.

Number of Beaded Bracelets	1	2	4	5	8	9	10	19	20
Cost	$2.25								

2 Callie can sell the beaded bracelets for $3.50 each. Fill in the table to show how much money Callie could make by selling different numbers of beaded bracelets.

Number of Beaded Bracelets	1	2	4	5	8	9	10	19	20
Revenue (money from sale)	$3.50								

3 She could also make woven bracelets. They cost $1.20 each to make. Fill in the table to show how much it would cost to make different numbers of woven bracelets.

Number of Woven Bracelets	1	5	9	10	15	49	50	99	100
Cost	$1.20								

NAME | DATE

Callie's Soccer Cleats page 2 of 2

4 The woven bracelets sell for $1.50. Fill in the table to show how much money Callie could make by selling different numbers of woven bracelets.

Number of Woven Bracelets	1	5	9	10	15	49	50	99	100
Revenue (money from sale)	$1.50								

5 Which kind of bracelet do you think Callie should make? Why?

NAME | DATE

Multiplication Battle

When you play Multiplication Battle, you get to draw 3 cards, and multiply the numbers on those cards in any order you want. Part of the idea is to put them in an order that makes it easy to get the answer. For example, if you got the cards 7, 8, and 5, you might decide to multiply them in this order: $(7 \times 8) \times 5$ because 7×8 is 56, and you can multiply 56 by 10 and then cut the product in half because 5 is half of 10.

1 Dana and Tyler were playing Multiplication Battle. Dana went first, and got the cards 5, 8, and 6.

a Dana said she solved the problem by finding the product of 8 and 5, and then multiplying that by 6. Write an expression to show her thinking.

b What is the product of 6, 8, and 5? Show your work. (You can put the numbers in a different order if you want; you don't have to use Dana's idea.)

2 Tyler went next and got 4, 7, and 5.

a Tyler said he solved the problem by finding the product of 7 and 5, and then doubling it twice. Write an expression to show his thinking.

b What is the product of 4, 7, and 5? (You can put the numbers in a different order if you want; you don't have to use Tyler's idea.)

3 If you were playing Multiplication Battle and got the cards 6, 7, and 9, what order would you use to make the problem easy to solve? Write an expression to show, and then solve the problem.

4 Round 13,674.947 to the nearest:

ten	one
tenth	hundredth

NAME | DATE

More Planning for Callie page 1 of 3

As Callie was planning how to raise money, she wondered about making other numbers of bracelets and cake pops.

1 Beaded bracelets cost $2.25 each to make. How much would it cost to make 61 beaded bracelets? Use the ratio table below to record your strategy.

Note You don't need to use all the boxes on this table or any of the others below; just use what you need and leave the rest.

Number of Beaded Bracelets	1								
Cost	$2.25								

It would cost _____ to make 61 beaded bracelets.

2 Beaded bracelets sell for $3.50 each. How much money would Callie bring in if she sold 42 beaded bracelets? Use the ratio table below to record your strategy.

Number of Beaded Bracelets									
Revenue (money from sale)									

42 beaded bracelets would sell for a total of _____.

3 Woven bracelets cost $1.20 each to make. How much would it cost to make 22 woven bracelets? Use the ratio table below to record your strategy.

Number of Woven Bracelets									
Cost									

It would cost _____ to make 22 woven bracelets.

NAME | DATE

More Planning for Callie page 2 of 3

4 Woven bracelets sell for $1.50 each. How much money would Callie bring in if she sold 55 woven bracelets? Use the information on the ratio table below, and write in your own to solve the problem.

Number of Woven Bracelets	1			10	5				
Revenue (money from sale)	$1.50	$3.00	$6.00			$67.50			

55 woven bracelets would sell for a total of _____.

5 Callie spilled frosting on several of her tables. Fill in all the spots that are covered. Use the information to answer the questions.

a Callie was figuring the cost to make cake pops at $1.25 each and found how many cake pops she could make if she had $67.50.

Number of Cake Pops	1	2		40	10				
Cost	$1.25		$5.00			$67.50			

How many cake pops can she make for $67.50? _____

b Callie made a different table to figure out how many cake pops she could make if she had $95.00.

Number of Cake Pops	1	2	20		5	50	25	75	
Cost	$1.25	$2.50		$12.50					$95.00

How many cake pops can she make for $95.00? _____

NAME | DATE

More Planning for Callie page 3 of 3

c One of Callie's tables was for beaded bracelets.

Number of Beaded Bracelets	1		4	40		5	
Cost	$2.25	$4.50			$22.50		$101.25

How many beaded bracelets can she make for $101.25? _____

d The last table showed woven bracelets.

Number of Woven Bracelets	1			10	5	
Revenue (money from sale)	$1.50	$3.00	$6.00			$67.50

How many woven bracelets can she make for $67.50? _____

6 **CHALLENGE** If Callie wants to make a ***profit*** of $100 or more selling bracelets, how many of each type do you think she should make? Explain your thinking.

NAME | DATE

With or Without

Callie's friend Vanessa also wants to raise money and decided to sell homemade frozen yogurt to her friends and neighbors.

1 Vanessa will sell vanilla yogurt for $2.50 a cup. Fill in the table to show how much money Vanessa will make if she sells 19 cups of vanilla yogurt.

Note You don't need to use all the boxes in this table or the ones below. Just use as many as you need and leave the rest.

Number of vanilla yogurt cups sold	1								
Revenue (money from sale)	$2.50								

Vanessa will make _____ if she sells 19 cups of vanilla yogurt.

2 Vanessa will sell vanilla yogurt in waffle cones for $2.75 each. Fill in the table to show how much money Vanessa will make if she sells 21 cones of vanilla yogurt.

Number of vanilla yogurt cones sold	1								
Revenue (money from sale)	$2.75								

Vanessa will make _____ if she sells 21 cones of vanilla yogurt.

3 Vanessa will also offer a variety of toppings for her yogurt for $0.35 a scoop. Fill in the table to show how much money Vanessa will make if she sells 49 scoops of toppings.

Number of scoops of toppings	1								
Revenue (money from sale)	$0.35								

Vanessa will make _____ if she sells 49 scoops of toppings.

NAME | DATE

Over & Under

1 Use relationships among the problems to help you solve them.

$\frac{1}{4}$ of 44 is _____ | $0.25 \times 44 =$ _____ | $25 \times 44 =$ _____

$26 \times 44 =$ _____ | $24 \times 44 =$ _____ | $0.24 \times 44 =$ _____

$\frac{1}{4}$ of 45 is _____ | $0.25 \times 45 =$ _____ | $25 \times 45 =$ _____

$26 \times 45 =$ _____ | $24 \times 45 =$ _____ | $0.24 \times 45 =$ _____

2 Use relationships among the problems to help you solve them.

$\frac{3}{4}$ of 32 is _____ | $0.75 \times 32 =$ _____ | $75 \times 32 =$ _____

$74 \times 32 =$ _____ | $76 \times 32 =$ _____ | $0.76 \times 32 =$ _____

$\frac{1}{4}$ of 33 is _____ | $0.75 \times 33 =$ _____ | $75 \times 33 =$ _____

$74 \times 33 =$ _____ | $76 \times 33 =$ _____ | $0.76 \times 33 =$ _____

3 **CHALLENGE** Use the answers to the problems above to help solve some of those below.

$76 \times 48 =$ _____ | $24 \times 96 =$ _____ | $0.76 \times 32 =$ _____

$25 \times 9 =$ _____ | $75 \times 37 =$ _____ | $76 \times 112 =$ _____

NAME | DATE

Making Cupcakes

1 A fancy cupcake costs $0.85 to make. Fill in the table to show how much it would cost to make 21 fancy cupcakes.

Note You don't need to use all the boxes in this table or the other one below. Just use as many as you need and leave the rest.

Number of Fancy Cupcakes	1								
Cost	$0.85								

It would cost _____ to make 21 fancy cupcakes.

2 How many fancy cupcakes could you make for $85.85?
Fill in the table to solve the problem.

Number of Fancy Cupcakes	1								
Cost	$0.85								

You could make _____ fancy cupcakes for $85.85.

3 Find 47 × 98, using the most efficient strategy you can. Show your work.

4 Find 987 ÷ 47, using the most efficient strategy you can. Show your work.

Home Connections

GRADE 5 – UNIT 4 – MODULE 2

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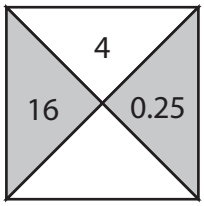
NAME | DATE

Multiplication Strategies page 1 of 2

1 The top box shows the *product* of the two middle numbers, and the bottom box shows the *sum* of the two middle numbers. Fill in the missing numbers.

a



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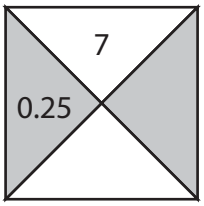

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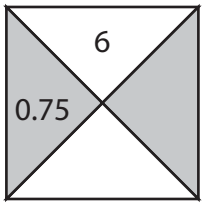

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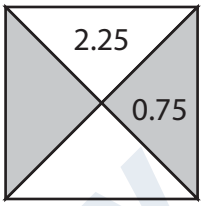

2 Find the product.

a $\frac{1}{5}$ of 40 =

b $\frac{1}{3}$ of 21 =

c $\frac{3}{5}$ of 40 =

d $\frac{2}{3}$ of 21 =

e $\frac{1}{6}$ of 24 =

f $\frac{1}{12}$ of 36 =

g $\frac{4}{6}$ of 24 =

h $\frac{4}{12}$ of 36 =

3 Matthew bought 16 gallons of gas for $4.25 per gallon. How much did he spend? Show your work.

(continued on next page)

NAME | DATE

Multiplication Strategies page 2 of 2

4 Tracy bought a dozen of her mother's favorite flowers for $9.00. How much did each flower cost? Show your thinking.

5 Gavin also bought a dozen flowers for his mother, but her favorite flowers cost $0.35 each. How much did Gavin spend? Show your thinking.

6 Xavier earns $12.50 for each lawn he mows. If he mowed 8 lawns last week, how much money did he earn? Show your work.

7 **CHALLENGE** Randi and her sister made balloon animals and sold them for $0.50 each at a school carnival. They made $48.00. If Randi made twice as many balloon animals as her sister, how many balloon animals did each girl make? Show your work.

NAME | DATE

Dante's Decision page 1 of 2

Dante wants to spend some of his allowance money, but he is having a hard time deciding what to buy. He loves baseball cards, packs of gum, and bouncy balls. Fill in the ratio tables and answer the questions to help Dante keep track of what he can buy.

1 Dante's favorite packs of baseball cards cost $1.70 each. Fill in the table below to show the cost of different numbers of packs of baseball cards.

Packs of Baseball Cards	1	2	4	8	9	10	15	25
Cost	$1.70							

2 Dante's favorite gum costs $0.60 a pack. Fill in the table below to show the cost of different numbers of packs of gum.

Packs of Gum	1	2	5	9	10	19	20	25
Cost	$0.60							

3 Bouncy balls come in packages that cost $3.15 each. Fill in the table below to show the cost of different numbers of packs of bouncy balls.

Packs of Bouncy Balls	1	2	3	6	9	10	12	20
Cost	$3.15							

4 Dante decided to spend only $20.00 of his allowance and save the rest for later.

a Can he buy 12 packs of baseball cards? Why or why not?

b Can he buy 30 packs of gum? Why or why not?

c How much of the $20.00 will he still have after he buys 5 packs of bouncy balls?

(continued on next page)

NAME | DATE

Dante's Decision page 2 of 2

5 Write the following decimals in base ten numerals.

a 3,000 + 60+ 0.4 + 0.002 _____

b One hundred seventeen and three-thousandths _____

6 Write the number names (words) for the following decimals.

a 300 + 0.10 + 0.004 _____

b 13.029 _____

7 Write the following decimals in expanded form.

ex 642.835 (6 × 100) + (4 × 10) + (2 × 1) + (8 × 0.1) + (3 × 0.01) + (5 × 0.001)

a Four thousand fifty-three and two hundred sixty-nine thousandths

b 9,615.243

8 Use >, =, or < to compare each pair of decimals.

45.01 ☐ 45.10 5.055 ☐ 5.550 19.023 ☐ 19.032 70.0 ☐ 0.70

9 **CHALLENGE** Abby is going to make tie-dyed T-shirts for her class to wear on a field trip. Each shirt costs $3.95 and the dye for each shirt costs $0.50. Abby also needs to buy two boxes of salt to add to the mix for $4.50 each. If she has collected $124.70, how many tie-dyed T-shirts can Abby make? Show your work.