



Grade 4 | Module 4

Topic: Multiplying fractions by whole numbers

[Module 4 Resources](#)

Students work with puzzles involving multiplication of a fraction by a whole number using area models and number line models. Students extend their understanding of multiplication to multiply a whole number by a fraction. Students solve rich problems involving multiplying a whole number by a fraction.

Module 4 at a Glance

Printed Resources

- **Bookmarks**
 - Problem Solving Process Bookmark
 - Problem Solving Facilitation Bookmark
- **Grades 3-5 Table Game Directions**
 - Race to 2
 - Five for Twenty-Five
 - *Traffic Lights Tic-Tac-Toe (optional)*
 - *Dara (optional)*
 - *Equivalent Fraction Concentration (optional)*
 - *Multiplication Connect Four (optional)*
 - *Number Line Fraction Bingo (optional)*
 - *Final Countdown (optional)*
 - Sudoku Puzzles (Day 4)

- **Problem Solving Journal** (pages 20–25)

- My Thinking Path
- Problem of the Day
- Exit Tickets
- ST Math Reflection

Teacher Resources

- Teacher Planner

Optional Printed Resources

- Accomplishments Log
- ST Math Activity Pages
- Pre/Post Quizzes

Immersion Slide Deck (slides 41–53)

- The Immersion Slide Deck is intended to be projected to the class in a whole group setting.

Supplies for Table Games (per group)

- **Race to 2** - 1 set of fraction cards, number line 0 to 2 for each player, 1 small game marker for each player
- **Five for Twenty-Five** - 1 deck of cards

My Thinking Path

- Daily reflection time for students on multiplying fractions by whole numbers.

ST Math Puzzle Talks

- Alien Bridge
- Fraction Multiplication on the Number Line
- Crank Pies Fraction Multiplication
- Alien Bridge Symbolic

Problem Solving

Day 1:

- **Problem of the Day** - Kevin poured 16 glasses of water from a jug. Each glass held $\frac{1}{8}$ cup of water. How much water was in Kevin's jug?

Day 2:

- **Problem of the Day** - Demarius made cupcakes for his sister's birthday. He made 34 cupcakes. If Demarius used $\frac{1}{8}$ cup of icing on each cupcake, how much icing did he use?

Day 3:

- **Problem of the Day** - Carlos drinks $\frac{2}{3}$ cup of milk at every meal and snack. How much milk does Carlos drink in one day if he eats breakfast, lunch, dinner, and an afternoon snack?

Day 4:

- **Problem of the Day** - Bev is knitting a scarf for her mother. She knits $\frac{1}{3}$ of a foot every day. How long will it take her to knit 2 feet of the scarf? Write a multiplication equation to show how long it will take her to make a scarf 4 feet long.

Instructional Stations

On Days 1–3, each student will visit two stations per day following the schedule in the [Instructional Stations Overview](#). On Day 4, students do not participate in Instructional Stations. Consider assigning students who need additional support to Station 1 to work with the teacher on concepts they are struggling with.

Station 1: Small Group Instruction

- Engage students in a math conversation about math concepts using a rich problem.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishments Log.

Station 3: Table Games

- Select Race to 2 or Five for Twenty-Five
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.



Grade 4 | Module 4 | Day 1

My Thinking Path (5-10 minutes)

- Have students write in the topic: "Multiplying fractions by whole numbers."
- Have students work on the My Thinking Path page in their journals.
- Discuss their ideas, and allow students to add to their paper any additional thoughts they have.
- Have students complete the Pre-Quiz (optional).

Puzzle Talk: Alien Bridge (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder? What do you think you need to do to solve this puzzle? What is the name of each fraction in the alien ship?" Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After they have had some think time, have them think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work.
- Select one of the students' strategies. Ask the students if they agree or disagree with the strategy.

Test and Observe

- Try a student's solution, and watch the feedback. Ask students to describe what happened.

Analyze and Learn

- Ask students to think about how what they saw happen compares to their prediction. What did they learn from the feedback about what the numerator and denominator represent? How does this affect their strategy?
- Show the next puzzle. Ask: "What is known in this puzzle? What is unknown? How is this problem similar to multiplying whole numbers? How is it different?"

Connect and Extend

- Try a student's solution. Pause the puzzle before JiJi crosses the screen. Ask students: "How could we represent what is happening in this puzzle using an equation?" Display the student's equations and prove whether or not they match the puzzle. Repeat with additional puzzles in Level 1.
- Display the first puzzle in Level 2. Discuss how this puzzle compares to the Level 1 puzzles. Ask: "How could we represent this puzzle in an equation? What is known? What is unknown? How do we write the solution as a fraction? Have students use a ? to represent the unknown, write an equation, and then solve for the unknown." Share students' equations and solutions.
- Ask: "Is the sum greater than, less than, or equal to 1? How do you know? Is the sum a whole number? How do you know?" Discuss students' strategies. How do the strategies compare to the strategies they use to multiply whole numbers? Repeat with additional puzzles in Level 2.
- Show a puzzle from Level 3. Ask: "What math story can we tell with this visual?"
- If time permits, repeat this activity allowing students to create their own story, either individually or with a partner.
- Students can pose their stories for their classmates to solve visually and symbolically.

How does the student:

- name the fraction in the alien ship and the fraction that represents the sum?
- determine whether the sum is greater than, less than, or equal to 1?
- explain the strategy they used to solve the puzzle?
- identify the known and unknown in the puzzle?
- represent the puzzle using an equation?
- compare multiplying a whole number by a whole number to multiplying a whole number times a fraction?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Kevin poured 16 glasses of water from a jug. Each glass held $\frac{1}{8}$ cup of water. How much water was in Kevin's jug?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See [Instructional Stations Overview](#).

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Fraction Multiplication on the Number Line*.
- Use the Problem Solving Process to discuss the game with the group.
- Have students draw a number line and show the steps Jiji shows to represent the multiplication on the number line.
- Discuss what is happening with each move.
- Relate whole number times a fraction multiplication to repeated addition of fractions and to whole number multiplication.
- Work with students on problems similar to the Problem of the Day. Use alternative number selections in the problem.
 - Wanda made cupcakes for her sister's birthday. She made 14 (10, 20, 16) cupcakes. If Wanda used $\frac{1}{8}$ ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{8}$) cup of icing on each cupcake, how much icing did she use?
- Have students show the jumps on a number line.
- Discuss the number of jumps and the size of each jump.
- What do each of these represent in the equation?

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishments Log.

Station 3: Table Games

- Select Race to 2 or Five for Twenty-Five.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.



Grade 4 | Module 4 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving multiplying fractions by whole numbers.

Puzzle Talk: Fraction Multiplication on the Number Line (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder? What do you think you need to do to solve this puzzle?" Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After they have had some think time, have them think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work. Then have students share out whole group

Test and Observe

- Try a student's solution, and watch the feedback. Ask students to describe what happened and if they agree or disagree with the strategy.

Analyze and Learn

- Ask students to think about how what they saw happen compares to what they thought would happen. What did they learn from the feedback? How does this affect their strategy?
- Pull up the next puzzle, and ask: "What does the problem mean at the top of the puzzle? How is multiplying fractions similar to multiplying whole numbers? How do you think we solve this puzzle?" Have students think, pair, share their ideas.
- Try a student's solution and watch the feedback. Say to students: "This problem said there were ___ groups of ___. JiJi counted out ___ of those pieces along the number line. Write the number where JiJi landed on your whiteboard."
- Ask students: "How did you determine where to put the rocket platform? How did you count along the number line? How many of the equal pieces did it take to make 1? How do you know?"
- Have students share their strategies. Repeat with additional puzzles in Level 1.

Connect and Extend

- Display the first puzzle in Level 2. Ask students: "Can you think of a story problem that this equation could represent?" Have a student turn and talk to a neighbor, and after some time, have some students share out.
- Solve additional puzzles in Level 2.

How does the student:

- write the solution as a fraction and mixed number?
- understand the relationship between addition and multiplication?
- place a fraction on a number line?
- explain how many equal pieces are needed to make 1?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Demarius made cupcakes for his sister's birthday. He made 34 cupcakes. If Demarius used $\frac{1}{8}$ cup of icing on each cupcake, how much icing did he use?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See [Instructional Stations Overview](#).

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Fraction Multiplication on the Number Line*.
- Use the Problem Solving Process to discuss the game with the group.
- Have students draw a number line and show the steps Jiji shows to represent the multiplication on the number line.
- Discuss what is happening with each move.
- Relate whole number times a fraction multiplication to repeated addition of fractions and to whole number multiplication.
- Work with students on problems similar to the Problem of the Day. Use alternative number selections in the problem.
 - Wanda made cupcakes for her sister's birthday. She made 14 (10, 20, 16) cupcakes. If Wanda used $\frac{1}{8}$ ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{8}$) cup of icing on each cupcake, how much icing did she use?
- Have students show the jumps on a number line.
- Discuss the number of jumps and the size of each jump.
- What do each of these represent in the equation?

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishments Log.

Station 3: Table Games

- Select Race to 2 or Five for Twenty-Five.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.



Grade 4 | Module 4 | Day 3

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving multiplying fractions by whole numbers.

Puzzle Talk: Crank Pies Fraction Multiplication (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder? What do you think you need to do to solve this puzzle?" Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After some think time, do think-pair-share and then ask some students to share out their strategies whole group.

Test and Observe

- Select one of the students' strategies and discuss if students agree or disagree with the strategy and why.

Analyze and Learn

- Try a student's solution, and watch the feedback. Ask students to describe what happened and think about what they saw happen. What did they learn from the feedback? Will they change their strategy?
- Pull up the next puzzle. Ask: "What is happening in this equation? What do we know about multiplying whole numbers that can help us solve this problem?"
- Move the cursor over the fraction circles at the bottom, and ask students: "Which denominator should we choose? How do you know?" Share students' thinking.
- Choose the correct denominator, and then ask: "How many shaded equal parts do we need in all? Why?" Connect the multiplication number sentence to a repeated addition number sentence and say to students, "If this problem says we have ___ groups of ___, how many total pieces do we need?"
- Move the cursor over the shaded pieces and count the pieces needed. Before clicking to solve the puzzle, ask students to record the solution as an equation on their whiteboards (e.g., $3 \times \frac{1}{3} = \frac{3}{3}$ or $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$).
- Repeat with additional puzzles in Level 1.
- Display the first puzzle in Level 2. Ask: "How is this puzzle different from the ones we just did?" Choose the denominator together and then move the cursor over the shaded pieces and count the pieces needed.
- Before clicking to solve the puzzle, ask: "What do you notice about the fraction that is our answer? What does it tell us if the numerator is bigger than the denominator?"

Connect and Extend

- Ask students to record the solution as an equation on their whiteboards (e.g., $2 \times \frac{3}{4} = \frac{6}{4}$). Ask students to record the solution as both a fraction and a mixed number. Have students write the solution as both a fraction and a mixed number. Have students explain why the fraction and mixed number are equal.
- Repeat with additional puzzles in Level 2.

How does the student:

- determine the number of partitions (denominator) needed in the pies?
- determine how many shaded equal pieces to select?
- write an equation to represent the puzzles?
- write the solution as a fraction and mixed number?
- understand the relationship between addition and multiplication?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Carlos drinks $\frac{2}{3}$ cup of milk at every meal and snack. How much milk does Carlos drink in one day if he eats breakfast, lunch, dinner, and an afternoon snack?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See [Instructional Stations Overview](#).

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Fraction Multiplication on the Number Line*.
- Use the Problem Solving Process to discuss the game with the group.
- Have students draw a number line and show the steps JiJi shows to represent the multiplication on the number line.
- Discuss what is happening with each move.
- Relate whole number times a fraction multiplication to repeated addition of fractions and to whole number multiplication.
- Work with students on problems similar to the Problem of the Day. Use alternative number selections in the problem.
 - Wanda made cupcakes for her sister's birthday. She made 14 (10, 20, 16) cupcakes. If Wanda used $\frac{1}{8}$ ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{8}$) cup of icing on each cupcake, how much icing did she use?
- Have students show the jumps on a number line.
- Discuss the number of jumps and the size of each jump.
- What do each of these represent in the equation?

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishments Log.

Station 3: Table Games

- Select Race to 2 or Five for Twenty-Five.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.



Grade 4 | Module 4 | Day 4

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving multiplying fractions by whole numbers. Students should complete the My Thinking Path reflection page in their journal.

Puzzle Talk: Alien Bridge Symbolic (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with fraction tools and whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: “What do you notice? What do you wonder?” Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After they have had some think time, have them think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work. Compare the circles in the sky to the circles selected at the bottom.

Test and Observe

- Try a student’s solution, and watch the feedback. Ask students to describe what happened after choosing the denominator and the numerator. What is being multiplied?

Analyze and Learn

- Ask students to think about how what they saw happen compares to what they thought would happen. What did they learn from the feedback? How does this affect their strategy?
- Show a puzzle from Level 2, and ask how this is different from Level 1. What fraction can we write to represent the circle inside the ship?

Connect and Extend

- Open another Level 2 puzzle, and ask students to write an addition sentence that would show what happens with the animation. Can you write your answer as a fraction and a mixed number (e.g., $3 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} + \frac{2}{3} = \frac{6}{3}$ or 2 whole circles)?
- Then, display the first puzzle in Level 5. Ask students what is unknown in this puzzle compared to the other puzzles we have solved. Say to students, “The unknown in this puzzle is the group size, but we do know how many groups we have and the total number. Work with a neighbor to write a number sentence and find the missing whole number.”
- Have students use their fraction tools to work together to solve the puzzle. Share student’s strategies and solutions. Ask students: “How did you know what denominator to choose? Why does the denominator stay the same when we multiply?”
- You may repeat with the remaining puzzles in Level 5.

How does the student:

- determine the correct denominator?
- determine the correct numerator?
- find the total number of shaded pieces?
- represent the puzzle and solution with an equation?
- write a number as both a fraction and a mixed number?
- connect multiplication of fractions to multiplication of whole numbers?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Bev is knitting a scarf for her mother. She knits $\frac{1}{3}$ of a foot every day. How long will it take her to knit 2 feet of the scarf? Write a multiplication equation to show how long it will take her to make a scarf 4 feet long.
 - Compare the two arrays you drew. How are they alike? How are they different?

Whole Group Table Games (20 minutes)

During this time you will introduce JiJi Sudoku. Students will play these games in the next module in Station 2.

- Introduce JiJi Sudoku using the simple picture game boards.
- Allow students to work together to solve the picture puzzles.
- If there's time, explain that Sudoku is usually played with numbers and share one or two of the additional numeric Sudoku puzzles.

Optional: ST Math Activity Page (15 minutes)

ST Math Activity Page

- Project the game, *Fraction Multiplication*.
- Play a few puzzles to help students understand the game.
- Have students turn to the ST Math Activity Page: *Fraction Multiplication*.
- Ask students what they notice about the content on the page. What do they wonder? Where do they want to start on the page?
- Give them time to complete the page.
- Discuss the page, and have students share their thinking.
- Take the time to compare strategies, and have students share their work.
- Make connections to the game.

Closing (10 minutes)

Thinking and Reflecting Time

- Have students complete the Post-Quiz (optional).
- Have students review their ST Math Puzzle Reflection, Exit Tickets, and Problem Solving work.
- Engage students in discussions about what they have learned in this module, what they have questions about, and what they would like to learn more about.