



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 5)

- **Problem Solving Journal** (pages 20–25)
 - My Thinking Path
 - Problem of the Day
 - Exit Tickets
 - ST Math Reflection
- **Design Challenge Station Booklet**
 - Page 16

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 1 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 1–4, each student will visit two stations a day for 20 minutes each. On Day 5, students do not rotate. They can either be assigned to a station or allowed to choose one to go to. 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

- Days 1–4: 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.

Station 4: Design Challenge

- Days 1–4: Students will continue to make changes to their games and, finalize their rules and directions.

Day 5: Design Challenge (Whole Group)

- Have the students test their games with the other students, get feedback, and then see what additional improvements they need to do to improve their games.
- As students are playing games, monitor student gameplay and use facilitation questions to help support their thinking about games and about math.



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 students' 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 in each station). They will visit the other two tomorrow.

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.

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.

Station 4: Design Challenge

- Students will finalize their rules on page 13 of their Design Challenge Station Booklet.
- Have students work on creating an advertisement for their game.
- What is the name of the game?
- What math does it teach?
- What do they want people to know about their game?



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 in each station). They will visit the other two tomorrow.

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.

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.

Station 4: Design Challenge

- Students will finalize their rules on page 13 of their Design Challenge Booklet.
- Have students work on creating an advertisement for their game.
- What is the name of the game?
- What math does it teach?
- What do they want people to know about their game?



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 a think-pair-share, and then ask some students to share 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., $3 \times 1/3 = 3/3$ or $1/3 + 1/3 + 1/3 = 3/3$).
- 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., $2 \times 3/4 = 6/4$). 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 in each station). They will visit the other two tomorrow.

Station 1: Small Group Instruction

- 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.

Station 4: Design Challenge

- Students will finalize their game rules.
- Students who have completed their game can work on creating an advertisement for their game.
- What is the name of the game?
- What math does it teach?
- What do they want people to know about their game?



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?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station). They will visit the other two tomorrow.

Station 1: Small Group Instruction

- 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.

Station 4: Design Challenge

- Students will finalize their game rules.
- Students who have completed their game can work on creating an advertisement for their game.
- What is the name of the game?
- What math does it teach?
- What do they want people to know about their game?



Grade 4 | Module 4 | Day 5

Design Challenge (40 minutes)

- Have the students test their games on the other students, get feedback, and then see what additional improvements they need to do to improve their games.
- Divide the students into groups. Rotate the games that the students created through the groups (there should be one person in each group who helped create the game).
- Give students 10-15 minutes to play the game.
- When students are done playing the game, ask them to rate the game using the [Game Tester Report](#). You may want to have some students share their thoughts.
- Rotate the games so the group will get a new game. Have students play that game and then complete a feedback sheet.
- As students are playing games, monitor student gameplay and use facilitation questions to help support their thinking about games and about math.
- Have students answer the Game Feedback Form on page 16 in their Design Challenge Station Booklet.

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 3.

- 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 ST Math 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.

Instructional Stations (20 minutes)

Focused Instructional Time

- During this station time, students do not rotate. They can either be assigned to a station or allowed to choose one to go to.
- This is an excellent opportunity to pull students who need additional support to Station 1: Small Group Instruction, where they can work with the teacher on concepts they are struggling with. Use the [Teacher Planner](#) to help target this time with students.

Station 1: Small Group Instruction

- Identify specific students for intervention or extension.
- Choose the ST Math puzzle or problem solving question that the students struggled with.
- You may choose to use the Teacher Planner to help you plan your instruction.

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. They can ask themselves the questions that are on the Problem Solving Process Poster.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishments Log.

Station 3: Table Games

- Allow students to choose one of the games they have learned.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge

- Have students continue to build their games.
- Once they have finished building their games, they will play the games as a group to test them out. Have students complete page 16 in the Design Challenge Station Booklet.
- After they test their games, students can make any changes to their games they see are needed. The goal is to have them done so other students can play their games on Day 5 to test them out.

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.