

Make Math Connect Activity Pack: Number Lines

Free printable math activities for grades K–5



Math is a subject that builds from kindergarten all the way through Algebra 2, but strong foundations, confidence, and the joy of learning math are solidified in early grades. Inside this pack, we're excited to get you started with printable number line activities for grades K–5.

Each activity shows how number lines are an essential building block of mathematical know-how that will help your students make math connections—and have fun while they do it!

Instructions for use

Focused on the use of number lines in each grade, these activities and games include opportunities to re-engage students with content and solidify their knowledge.

Follow the directions to gather necessary materials, set the stage, and engage students in playful learning. Be sure to note the ongoing assessment suggestions for each activity and integrate them throughout the experience.

And don't forget to have fun!

How do number lines make math connect?

ClearMath Elementary uses number lines across grade levels to develop the major work of each grade. Beginning with number paths in kindergarten, moving to open number lines in grades 2 and 3, and then combining vertical and horizontal number lines to create area models to multiply fractions in grade 5, students gradually develop the ability to visualize magnitudes to operate and compare numbers.

To learn more about ClearMath Elementary, part of our comprehensive K–12 ClearMath Solutions, visit:

www.carnegielearning.com/cmef



Table of contents

Kindergarten: What Could My Number Be?

Instructions.....pg. 4
Student printable.....pg. 5

Grade 1: Moving On Up

Instructions.....pg. 6
Student instructions.....pg. 7
Student gameboard.....pg. 8
Student recording sheet.....pg. 9

Grade 2: Jumping Back to 0

Instructions.....pg. 10
Student instructions.....pg. 11
Student gameboard.....pg. 12

Grade 3: Creating Race Tracks

Instructions.....pg. 14
Student printable.....pg. 16

Grade 4: Adding Fractions on the Open Number Line

Instructions.....pg. 18
Student printable.....pg. 20

Grade 5: Multiple Representations

Instructions.....pg. 22
Student printable.....pg. 24



What Could My Number Be?

ClearMath Elementary intentionally introduces the number line as a number path in kindergarten to support the youngest learners to recognize each number as a quantity in and of itself.

Follow these directions to play What Could My Number Be? with your students.

You'll need to gather:

- What Could My Number Be? printable (one per class)
- Sticky notes

Setting the stage

- Display a number path from 0 to 10.
- Prepare sticky notes to place on the number path.
- Direct students to the What Could My Number Be? activity.
- Read the directions with students.

Task

- Tell students they are going to play What Could My Number Be? They will need to guess the number you are thinking of.
- Give students hints to help them determine your number. For example, *My number is less than 7*. Place a sticky note under the 7 on the number path and write *less than 7* on it. Ask students:

What could the number be?

Sample answer: It could be any number from 0 to 6.

Which numbers should you cross out on the number path?

Sample answer: I should cross out the numbers 7, 8, 9, and 10.

- Have students cross off the numbers on the first number path in the activity.
- Give another hint, such as *My number is greater than 2*. Place another sticky note under the 2 and write *greater than 2* on it. Ask students:

Which numbers should you cross out on the number path?

Sample answer: I should cross out 0, 1, and 2.

- Have students cross off the numbers on the number path. Ask students:

What do you know about my number now?

Sample answer: It is 3, 4, 5, or 6. It is less than 7 but greater than 2.

- Continue giving clues and crossing numbers on the number path off until students can correctly identify your number.

Ongoing assessment

Observe students while they eliminate numbers.

- Are they able to eliminate several numbers at a time based on the clues?
- Are they using greater than and less than to describe why they can eliminate certain numbers?
- Are they catching on to the words used to mark each clue?

Closing

Facilitate a discussion about how students identified the number. Ask students:

What strategy helped you solve the riddle?

Sample answer: I pointed to the number in the clue and then listened for the words less than or greater than.

Comparing Numbers in Stories

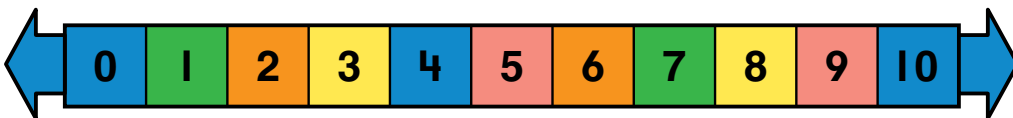
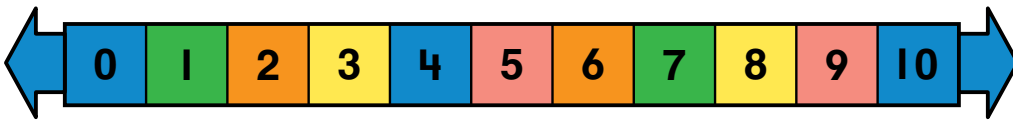
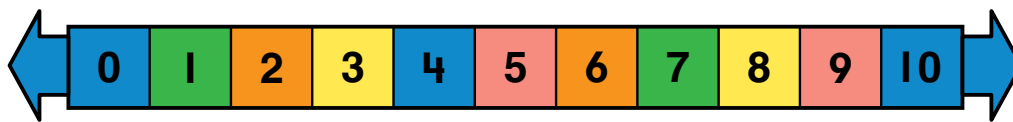
Game



Explore

What Could My Number Be?

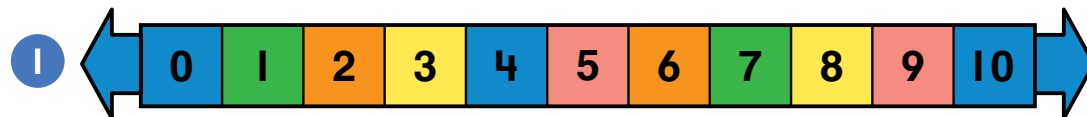
Directions: Use this recording sheet to play the game.



Reflect

Reflect and Summarize

Directions: Think about what you learned in this lesson. Then, look at the number path and circle a number greater than 6.



Moving On Up

In grade 1, students transition from the number path to the number line and use it to add and subtract. They apply their understanding of number patterns to add within 99.

Follow these directions to play Moving On Up with your students.

You'll need to gather:

- Moving On Up printable gameboard (one per pair of students)
- Moving On Up printable recording sheet (one per student)
- Moving On Up printable instructions (one per class)
- Counters (one per student)
- Number cubes (one per pair of students)

Setting the stage

- Explain to students that they will play the game Moving On Up.
- Display the Instructions for Moving On Up resource.
- Discuss the instructions for the game as a class.
- Ensure that students understand the goal and the directions for the game.
- Provide pairs of students with 2 counters and a number cube.
- Direct students to the Moving On Up activity. Explain to students that each player will move a counter on their own gameboard and record their moves on their own recording sheet.

Task

- Have students play the game in pairs.
- As you monitor students, discuss their strategies.

When you roll a 3 on the number cube, what are the two possible moves you can make?

Sample answer: I can move my counter forward 3 rooms or up 3 floors.

When you roll a 3 on the number cube, what are the two possible numbers you can add to your room number?

Sample answer: I can add 3 to my room number by moving forward 3 rooms, or I can add 30 to my room number by moving up 3 floors.

When might you need to subtract when you roll a 3?

Sample answer: When my counter is on Room 97, moving 3 floors up or 3 rooms right would put me past Room 99. So, then I would need to either subtract 30 or subtract 3.

Ongoing assessment

Observe students as they play Moving On Up.

- Can students describe each move by writing an equation?
- Are students counting spaces or counting on their fingers to add?
- Are students talking about strategies or making predictions?

Closing

Have students share their strategies for determining how to move their counters.

When in the game did you move your counter up? When in the game did you move your counter to the right?

Sample answers: I moved my counter up at the beginning of the game when I was far away from Room 99. I moved my counter to the right later in the game when I was closer to Room 99 and the number I rolled was greater than the number of floors I could move up.

Game
Instructions

Moving On Up

Goal: Be the first player to reach Room 99 on the Number Line Hotel

- 1 To start, each player places a counter on the number 0 on their own gameboard.
 - 2 Player 1 rolls a number cube and decides to move their counter that many floors up or that many floors forward.
 - When both moves take you past Room 99, move that many rooms backward or that many floors down.
 - 3 Player 1 records the number rolled on their recording sheet. Then, Player 1 writes an equation to describe the move.
 - Player 2 checks the equation.
 - 4 Switch roles. Now Player 2 rolls the number cube.
 - 5 Repeat Steps 2–4.
- The winner is the first player to land exactly on Room 99.

Adding and Subtracting
on the Number Line Hotel

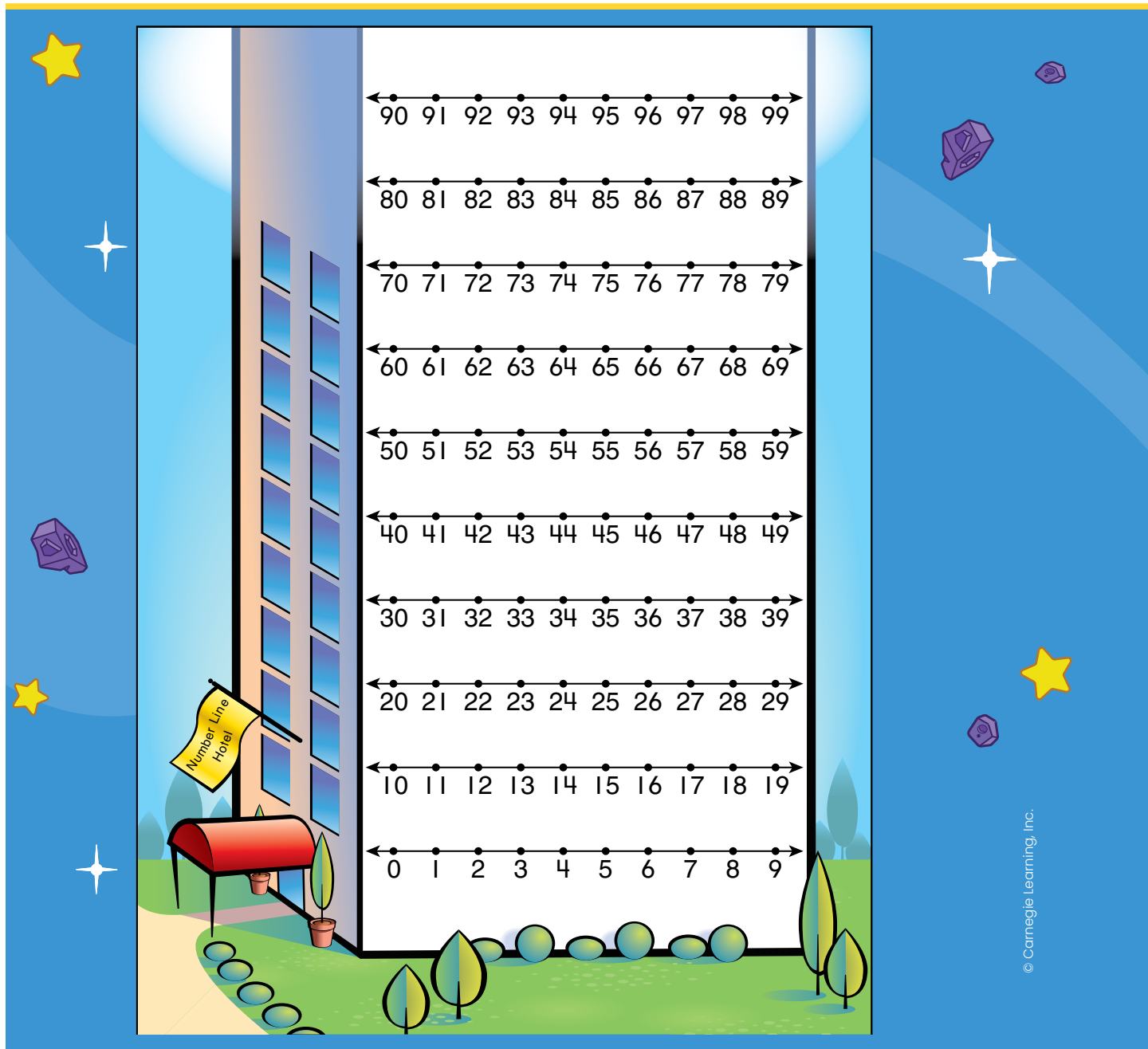
Game



Explore

Moving On Up

➤ Use this gameboard to play the game.



© Carnegie Learning, Inc.

➤ Use this recording sheet to play the game.

Roll	Equation

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Jumping Back to 0

In grade 2, students extend their understanding of iterating units in grade 1 to measuring with a ruler. They then connect their understanding of adding and subtracting measurement units to add and subtract on an open number line. The open number line provides more flexibility in solving problems.

Follow these directions to play Jumping Back to 0 with your students.

You'll need to gather:

- Crayons or colored pencils (two per student, different colors)
- Cutouts of Serena (one per pair of students)
- Jumping Back to 0 instructions (one per pair of students)
- Jumping Back to 0 printable gameboard (one per pair of students)
- Number cubes (one per pair of students)

Setting the stage

- Tell students that they are going to play a game with a partner.
- Display the Instructions for Jumping Back to 0 resource and discuss how to play the game.
- Provide each pair with a number cube and a cutout of Serena.

Task

- Direct students to the Jumping Back to 0 activity and have them play the game.
- Have students use a different color to show their jumps and their landings.
- As students play, monitor students' jumps, particularly as they jump across tens.

Ongoing assessment

Observe students as they play the game.

- Do students model a take away strategy on the number line?
- When subtracting 11, do students subtract by ones or do they subtract a ten and 1 one?

Closing

Discuss strategies students used during the game.

What strategies did you use to count on the number line?

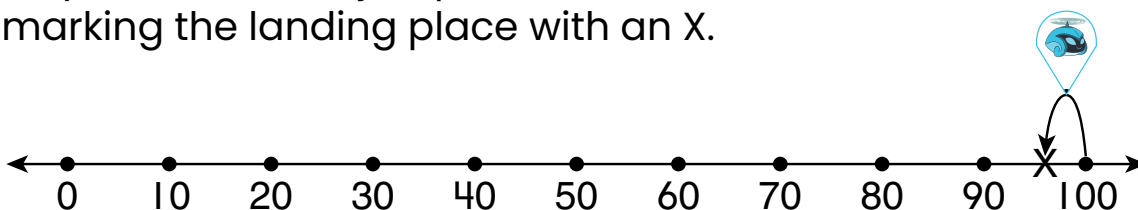
Sample answer: I used Serena to make jumps backward on the number line. When I needed to subtract 11, I first jumped back 10 and then 1 more.



Game
Instructions

Jumping Back to 0

- 1 Each player records jumps on their number lines starting at 100.
- 2 Player 1 rolls a number cube.
- 3 Player 1 uses their cutout of Serena to model the jump on the number line, beginning at 100 and moving toward 0.
- 4 Once both players agree on the correct jump, Player 1 draws the jump on the number line, marking the landing place with an X.



- 5 Player 2 rolls the number cube. They model their jump and record it on their number line, continuing to jump back to 0.
- 6 Players take turns until one reaches 0.
- 7 In the next round, players use the second number line. This time, add 10 to every number rolled before jumping.

When a player rolls a 1, they add 10 to it and can subtract 11 instead of 1.



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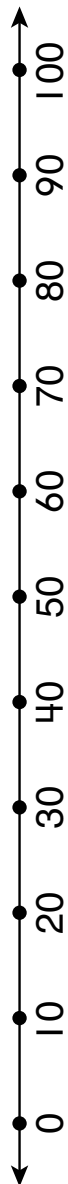
Game



Explore

Jumping Back to 0

➤ Use the number lines to play the game.



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Creating Race Tracks

In grade 3, students expand their understanding of a number line to include values between the whole numbers. They connect their understanding of number lines, fractions, and measurement to build a number line by measuring fractional units. Through engaging with these activities, they see that a number line can show whole numbers and fractions.

Follow these directions to play Creating Race Tracks with your students.

You'll need to gather:

- Creating Race Tracks printable (one per student)

Setting the stage

- Tell students that they are going to build race tracks for a character named Bunny.
- Explain that the race tracks only show the whole-mile markers but that there are stops in between that they will need to locate and label so Bunny always knows how far she has run.

Task

- Direct students to the Creating Race Tracks activity. Have a student read the directions aloud.
- Use a Think-Pair-Share routine to determine the unit fraction for each piece in Question

Each whole on the number line in Question 1 is partitioned into how many pieces?

Answer: 3

What unit fraction represents each piece?

Answer: One-third

- Have students record the unit fraction for Question 1.
- Repeat the Think-Pair-Share routine for Question 2.
- Tell students that you are going to give clues on Bunny's location and that they will need to point to the correct location on the number line.
- Tell students that Bunny is on the race track in Question 1 and ran 2 whole miles. Have them determine and point to Bunny's current location.
- Tell students that so far, she ran 2 pieces of size 1 third mile.

Where is Bunny?

Answer: She is at two-thirds of a mile.

What label can you use to describe this point on the number line?

Answer: two-thirds

- Continue by giving each clue and having students label each point on the number lines.
- Bunny is on the race track in Question 1. She has run 3 pieces of size one-third mile.

Where is Bunny?

Answer: She is at three-thirds of a mile.

- Bunny is on the race track in Question 1. She has run 5 pieces of size 1 third mile.

Where is Bunny?

Answer: She is at five-thirds of a mile.

- Bunny is on the race track in Question 2. She has run 7 pieces of size 1 fourth mile.

Where is Bunny?

Answer: She is at seven-fourths of a mile.

Ongoing assessment

Observe students as they label each number line.

- Do students recognize that each section of the number line is the size of the unit fraction?
- Do students recognize the change in unit? They can count by whole numbers on the number line, or they can count by the unit fraction.

Closing

Facilitate a discussion on whole numbers and fraction labels on the same tick mark.

● **Which tick marks on the first number line have two labels?**

Sample answer: On the first number line, 3 thirds and 1 whole are on the same tick mark.

● **Why does one tick mark get two labels on a track?**

Sample answer: When Bunny runs 3 pieces of size 1 third, then she runs 1 whole mile.

● **What is another example of a tick mark that has two labels on a track?**

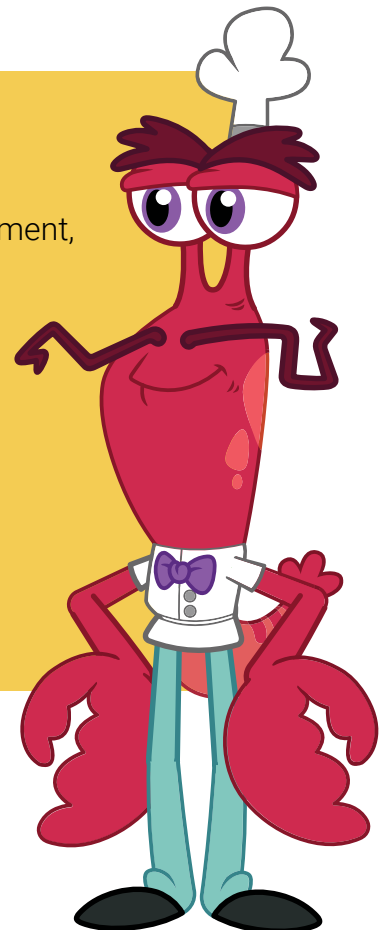
Sample answer: On the second track, 8 fourths and 2 wholes are on the same tick mark. Bunny ran 4 pieces of size 1 fourth to get to 1 whole, so she needed to run another 4 pieces of size 1 fourth to get to 2 wholes. Altogether, that would be 8 fourths.

Teacher Tip:

Think-Pair-Share is a great strategy to focus attention, prompt engagement, and build communication skills.

First time trying a Think-Pair-Share? Follow these steps:

1. Ask the question and give your students plenty of time to think about the answer on their own.
2. Tell students to turn to a partner and share their responses.
3. Finally, allow several student pairs to share their responses. Expand on their ideas with the entire class.



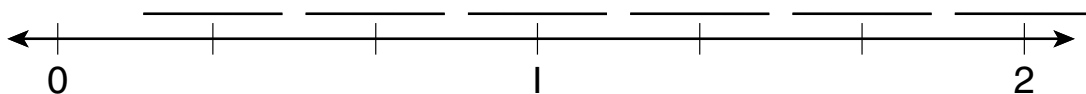
Bunny Goes for a Run

Explore

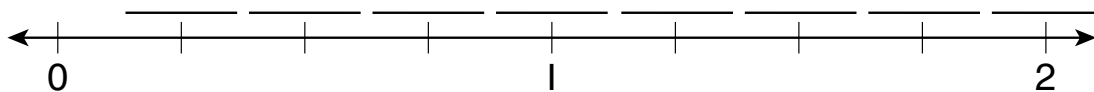
Creating Race Tracks

➤ Write the unit fraction that represents each section of the number line. Then, label each tick mark with a fraction.

1 _____



2 _____



Reflect

Reflect and Summarize

➤ Think about what you learned in this lesson.

A race track has snack stations every $\frac{1}{6}$ of a mile. Bunny ran 8 sections of size $\frac{1}{6}$.

1 Write a *B* at Bunny's location and label the tick mark with a fraction. Explain how you know.



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Adding Fractions on the Open Number Line

In grade 4, students revisit the open number line to add fractions with like units. The open number line supports students in using various strategies to add fractions. It also supports them in connecting their understanding of adding like units with whole numbers (adding ones with ones, tens with tens, etc.) to adding like units with fractions.

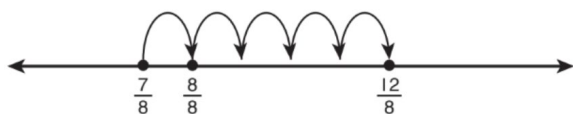
Follow these directions to play Adding Fractions on the Open Number Line with your students.

You'll need to gather:

- Adding Fractions on the Open Number Line printable (one per student)

Setting the stage

- Direct students to the Adding Fractions on the Open Number Line activity.
 - Have a student read the directions aloud.
 - Have students work with a partner on Questions 1 and 2, placing one addend on the number line. Then, have them consider how to model jumps to represent the other addend and determine the sum.
- Does it matter which number you choose as the first addend? Why or why not?**
Sample answer: It does not matter because of the Commutative Property of Addition.
- Which number will you place on the number line first? Explain your reasoning.**
Sample answer: I will place the greater number first, $\frac{7}{8}$. I will need to do fewer jumps to determine the answer.
- As you monitor students, identify two students that used the number line in different ways. Have these students share their strategies with the class.
 - Facilitate a discussion about the similarities and differences between the student work samples.
 - Ensure students discuss decomposing one addend into a sum of unit fractions to determine what jumps to make on the open number line.
- How can you decompose $\frac{5}{8}$ into unit fractions?**
Answer: $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$
- How would you add that to $\frac{7}{8}$?**
Sample answer: I would first add $\frac{1}{8}$ to get to $\frac{8}{8}$, which is 1 whole. From there, I need to add $\frac{4}{8}$, which I can represent as $1 + \frac{4}{8} = 1\frac{4}{8}$, or $\frac{8}{8} + \frac{4}{8} = \frac{12}{8}$
- Ensure students discuss decomposing one addend into a sum of unit fractions to determine what jumps to make on the open number line.



Task

- Have students work in pairs to answer the rest of the questions.
- As you monitor students, note the different strategies students are using to model fraction addition on the open number lines.
- Students may leave their answers in the form of a fraction greater than 1 or a mixed number when applicable.

Ongoing assessment

Observe students during the task.

- Can students decompose fractions into unit fractions?
- Are students strategically placing an addend on the open number line?
- Are students counting on by unit fractions or making other strategic jumps?

Closing

Facilitate a discussion about using the open number line as an efficient tool to jump to a friendly number, much like they would when adding whole numbers.

- **How would you model adding 5 and 6 on an open number line?**

 Sample answer: I would place a point and label it 6. Then, I would make 5 jumps to the right and place a point where I end up. I can count on as I make the jumps to see that I arrive at the value of 11.

- **How would you add $5/10$ and $6/10$ on a number line?**

 Sample answer: I would do the same thing that I did for adding 5 and 6. The difference is that now each hop represents $1/10$ instead of 1. So, I arrive at the value of $11/10$.

- Ensure students know they can rely on their knowledge of putting together and taking apart fractional quantities by the unit fraction to add fractions on the open number line.

Adding Fractions with Like Denominators

Explore

Adding Fractions on the Open Number Line

➤ Use an open number line to determine each sum.

1 $\frac{7}{8} + \frac{5}{8} = \frac{\boxed{}}{\boxed{}}$



2 $\frac{3}{5} + \frac{2}{5} = \frac{\boxed{}}{\boxed{}}$

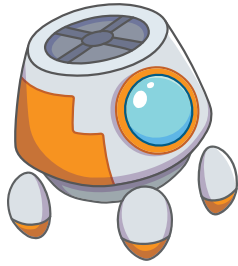


3 $\frac{7}{12} + \frac{4}{12} = \frac{\boxed{}}{\boxed{}}$



4 $\frac{4}{6} + \frac{4}{6} = \frac{\boxed{}}{\boxed{}}$





Sometimes I like to use 1 jump to add. Other times, I like to use more than 1 jump.

5 $\frac{1}{10} + \frac{5}{10} = \frac{\boxed{}}{\boxed{}}$



6 $\frac{9}{100} + \frac{7}{100} = \frac{\boxed{}}{\boxed{}}$



7 $\frac{8}{12} + \frac{3}{12} = \frac{\boxed{}}{\boxed{}}$



8 $\frac{1}{3} + \frac{2}{3} = \frac{\boxed{}}{\boxed{}}$



Multiple Representations

In grade 5, students connect their understanding of iterating fractions to build a bar model to multiply unit fractions. They then multiply fractions with area models, which requires them to consider overlapping vertical and horizontal number lines.

Follow these directions to play Multiple Representations with your students.

You'll need to gather:

- Multiple Representations printable (one per student)

Setting the stage

- Direct students to the Multiple Representations activity. Have a student read the directions aloud.

Task

- Use a Think-Pair-Share routine to have students analyze the strategies of each student.

Why is each model correct?

Sample answer: Aaliyah's work is correct because it matches the model Henry made. Lachlan's model shows $\frac{2}{3}$ of $\frac{3}{8}$.

- Have students identify where the factors and products are located in each student's representation.
- Have students work in pairs to complete Questions 1–4.
- While monitoring students, discuss the strategies used by each student.

When taking the fractional value $\frac{2}{3}$ of the fractional value $\frac{3}{8}$, which factor do you think the students represented first?

Sample answer: I think they represented $\frac{3}{8}$ and then further partitioned it to calculate $\frac{2}{3}$ of $\frac{3}{8}$.

How do the models justify Aaliyah's method?

Sample answer: In Henry's and Camila's models, the overlap of the two factors shows the multiplication of the numerators. The total number of parts shows the multiplication of the denominators.

Ongoing assessment

Observe students as they examine the different representations.

- Are students correctly identifying where factors and products are located in the different representations?
- Do students understand that when they multiply two fractions less than one, they are taking part of a part?

Closing

- Discuss the generalization of multiplying fractions by multiplying the numerators and multiplying the denominators. Guide students to conclude that this procedure works for all instances of fraction multiplication.
- Then, facilitate a discussion about the product of two fractions less than one.

 **What do you notice about the product of two fractions less than one?**

Sample answer: The product is less than one.

 **Why is the product of two fractions less than one a fraction less than one?**

Sample answer: When multiplying two fractions less than one, I am taking a part of a part.



Teacher Tip:

Think-Pair-Share is a great strategy to focus attention, prompt engagement, and build communication skills.

First time trying a Think-Pair-Share? Follow these steps:

1. Ask the question and give your students plenty of time to think about the answer on their own.
2. Tell students to turn to a partner and share their responses.
3. Finally, allow several student pairs to share their responses. Expand on their ideas with the entire class.

Using Area Models to Multiply Fractions

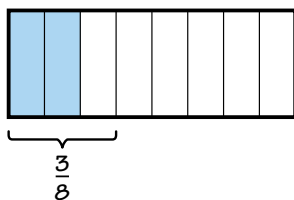
Explore

Multiple Representations

➤ Analyze the strategies. Then, answer each question.



Lachlan



$$\frac{2}{3} \times \frac{3}{8} = \frac{2}{8}$$

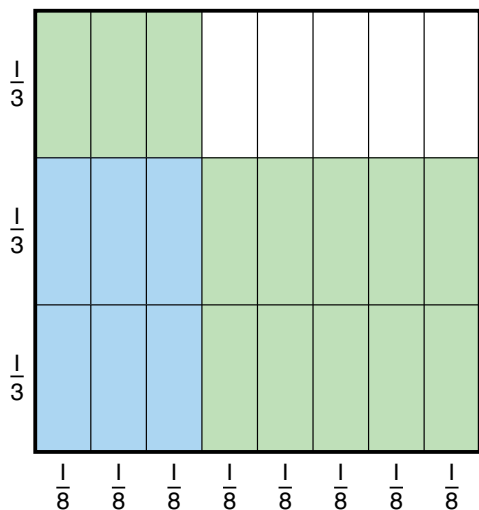


Aaliyah

$$\frac{2}{3} \times \frac{3}{8} = \frac{2 \times 3}{3 \times 8} = \frac{6}{24}$$



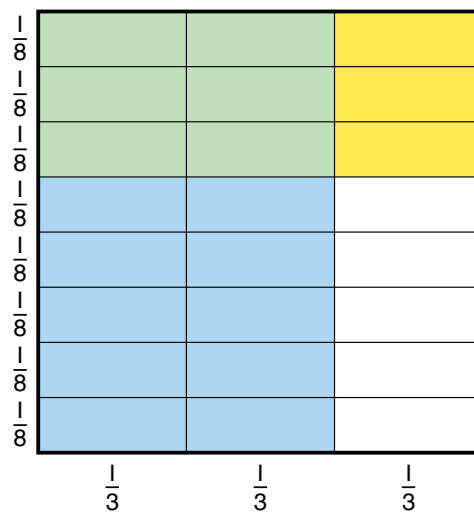
Camila



$$\frac{2}{3} \times \frac{3}{8} = \frac{6}{24}$$



Henry



$$\frac{2}{3} \times \frac{3}{8} = \frac{6}{24}$$



1 How are the methods alike?

2 How are the methods different?

3 Which method do you prefer? Why?



4 Carlos noticed that when he multiplies 2 fractions less than 1, the product is less than each of the 2 fractions he multiplied. Owen didn't think Carlos's products were correct because he learned that when multiplying, the product is greater than the factors. Who is correct? Explain your reasoning.

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Watch the video to learn more
about ClearMath Elementary.



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