Illustrative Mathematics®

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GRADE 3

Unit

2

Teacher Adaptation Pack

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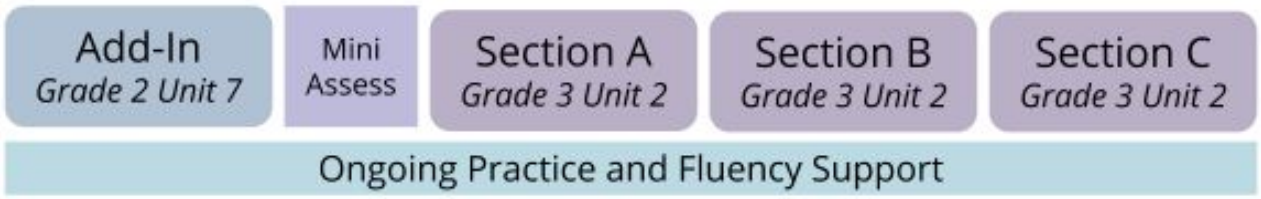
K5_Beta

Grade 3 Unit 2 Teacher Adaptation Pack

Directions for Use

1. Read the current grade level unit standards and dependencies.
2. Ask prior grade level teachers if students were taught the topics when school was in physical session last year. Another option is to show the students a problem on the topic and anonymously ask students if they know how to solve the problem.
    a. If yes, start the current grade level section without the add-in lessons.
    b. If not, teach the prior grade level add-in lessons.
3. After the add-in lessons, give the mini-assessment.
    a. If students got the questions correct, start the current grade level section.
    b. If students got some things correct, start the current grade level section, but use the ongoing practice materials to support students.

Recommended Implementation



Grade 3 Unit 2: Area and Multiplication	
Standards	• 3.MD.C.5, 3.MD.C.6, 3.MD.7, 3.OA.8
Prior-Grade Connections	• 2.G.A.2
Rationale	In 3.2 Section A, students learn about the concept of area. They use square tiles to represent the area of two-dimensional shapes by covering the shape with no gaps or overlaps. They then find the area of the shape by counting the number of square tiles. This work relies on students' grade 2 understanding of how to partition a rectangle into rows and columns of equal-sized squares, and determine how many squares there are by counting them. In Sections B and C, students relate what they learn in Section A about area to multiplication and addition. They learn that they can multiply the length and width of a rectangle to find the area. They also learn that area is additive, so they can partition a large rectangle or rectilinear figure into smaller rectangles, and find the total area by calculating the sum of the smaller areas. Like Section A, this learning relies on students' ability to partition a rectangle into smaller squares, a concept developed in grade 2.
Add-in Lessons	Before Section A: • 2.7 Lesson 11 • 2.7 Lesson 12
3.2 Lessons to Combine or Skip	None
Prior-grade Practice and Fluency	• Grade 2 Addition Number Talks • Grade 2 True or False routines involving sums of equal groups • Grade 2 Choral Counts involving skip-counting
Extension and Exploration	• IM Task: Partitioning a Rectangle into Unit Squares • Unit 8 lesson from Grade 2
Assessment	Mini-Assessment If students need Ongoing Practice • Center: Equal Groups Concentration Stage 3

Table of Contents

2.7 Lesson 11: Arrays and Rectangles

Teacher-facing Learning Goals

- Partition rectangles into rows and columns with equal-sized squares.

Addressing CCSS: 2.OA.C.4, 2.G.A.2

Lesson Purpose

The purpose of this lesson is for students to make an array with tiles, push them together to make a rectangle, and see that the rectangle is composed of squares that are arranged in rows and columns. Students partition rectangles into equal-sized squares with support.

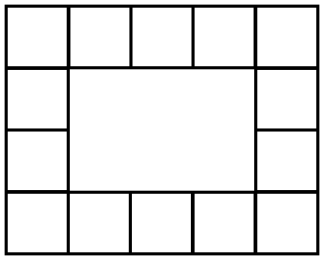
Materials Needed

Gather

- display Image (warm-up, Activity 1 synthesis, Activity 2 synthesis, lesson synthesis)
- crayons or colored pencils, at least 2 colors for each student
- rulers

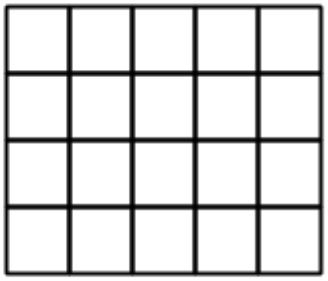
Cool-down: Partitioning Rectangles into Squares

1. Draw lines so the rectangle is completely filled with equal-sized squares.



2. Write 2 equations to represent this array.

Student Responses

1. 
2. 4 + 4 + 4 + 4 + 4 = 20
   5 + 5 + 5 + 5 = 20

Teacher Reflection Question

Which students struggled to make equal-sized squares? Was the struggle with motor skills or understanding that the squares need to be equal? How can you support these students as they continue with partitioning rectangles?

Lesson Narrative

In an earlier unit, students partitioned rectangles to make halves, thirds, or fourths. While they have had practice with partitioning, the focus for this work is different. Students will not name the parts in terms of fractions, but they will attend to making equal-sized squares.

The **purpose** of this lesson is for students to partition rectangles into equal-sized squares with support. Students make the connection between an array of individual objects that don't touch each other and a partition of a rectangle into individual squares that do touch each other. Students begin by arranging tiles to make an array, then push them together to make a rectangle. They represent their rectangle by shading squares on a grid. Students recognize that the squares within the rectangle are arranged in rows and columns, and that the total number of squares within the rectangle can be represented by writing equations to show the sum of the number of squares in the rows or the number of squares in the columns.

Access for Students with Disabilities	**Access for English Learners**
Activity 1: Representation	Activity 1: MLR2 Collect and Display

Student-facing Learning Goal: Let's make arrays and rectangles using tiles.

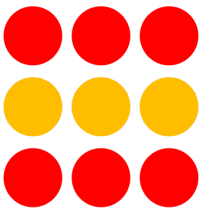
Warm-up Narrative: Which One Doesn't Belong?: All Kinds of Arrays	**Addressing CCSS:** 2.OA.C.4

This warm-up prompts students to carefully analyze and compare different arrays. In making comparisons, students have a reason to use language precisely (MP6). The activity also enables the teacher to hear how they talk about arrays, rows, and columns, and how they find the total number of objects in an array.

Task Statement

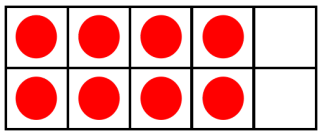
Which One Doesn't Belong?

A

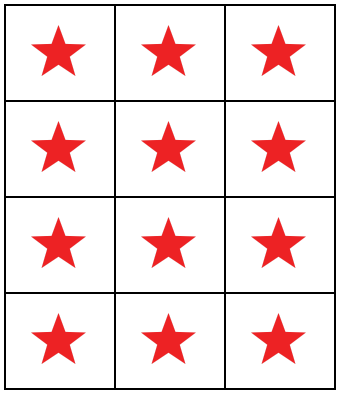


B

C



D



Student Responses

- A is the only one that is an odd number
- B is the only one made up of real objects (eggs).
- C is the only one that has empty spaces/not a full array.
- D is the only one showing more than 10.

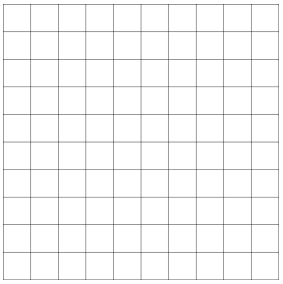
Launch/Activity

- Groups of 2
- Display image.
- "Pick one that doesn't belong. Be ready to share why it doesn't belong."
- 1 minute: quiet think time
- 2-3 minutes: partner discussion
- Record responses.

Synthesis

- "What do A, B, and D have in common?" (They all show arrays with 3 in each row.)
- "D has 4 rows and 3 columns. This rectangle is partitioned into equal-sized squares."

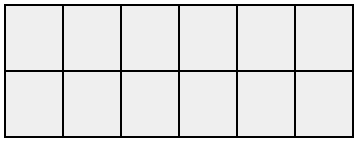
Activity 1 Narrative: Using Tiles to Make Arrays	**Addressing CCSS:** 2.OA.C.4, 2.G.A.2
The **purpose** of this activity is to make connections between arranging objects to make an array and making a rectangle from equal-sized squares.	
SwD Support Tags • Representation	
MLR Tags • MLR2 Collect and Display	
EL Support Text *MLR2 Collect and Display* Collect the language students use to work with arrays. Display words and phrases such as: rows, columns, equations, and equal groups. During the synthesis, invite students to suggest ways to update the display: "What are some other words or phrases we should include?" etc. Invite students to borrow language from the display as needed. *Advances: Conversing, Reading*	
SwD Support Text *Representation: Develop Language and Symbols* Activity: Maintain a visible display to record new vocabulary. Invite students to suggest details (words or pictures) that will help them remember the meaning of the words rows, columns, and equations. *Supports accessibility for: Memory*	
Task Statement Choose a number of tiles. 12 15 16 18 20 Arrange all of the tiles in an array. Then push them together to make a rectangle. 1. Shade in the same arrangement of squares on the grid paper.	**Launch/Activity** • Groups of 2 • Arrange 6 tiles into an array with 2 rows and 3 columns. Show students that you can push them together to make a rectangle. • Give students access to inch tiles and colored pencils. • Each group should choose 12, 15, 16, 18, or 20 tiles. • "You and your partner can choose 12, 15, 16, 18, or 20 tiles. Arrange all of the tiles in an array. Then push them together to make a rectangle." • "Shade in the same arrangement of



2. How many rows of squares does your rectangle have?
3. How many columns does your rectangle have?
4. How many tiles are in your rectangle?
5. Write 2 equations to represent the number of squares in your rectangle.

Student Responses

Answers vary. Sample response:

1. 
2. 2 rows
3. 6 columns
4. 12 squares in all.
5. 2 + 2 + 2 + 2 + 2 + 2

   6 + 6

squares on the grid paper to represent the rectangle you've made."
- "Answer the questions about your rectangle. If you have time, choose a different number of tiles and make another rectangle."
- 10 minutes: partner work time
- Monitor for student work to display during the synthesis.

Synthesis

- Display student work
- "Describe this rectangle." (It has ___ rows of squares. It has ___ columns of squares. It has ___ squares in all?)
- If needed, ask
  - "How many squares are in each row?"
  - "How many squares are in each column?"
  - "What equations could we write to represent the number of squares in this rectangle?"

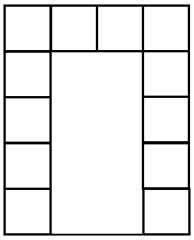
Activity 2 Narrative: Partitioning Rectangles to Make Equal-Sized Squares	**Addressing CCSS:** 2.OA.C.4, 2.G.A.2

The **purpose** of this activity is for students to finish partitioning of a rectangle into equal-sized squares. This work will prepare students for partitioning rectangles on their own in later lessons.

Task Statement	**Launch/Activity**

1.

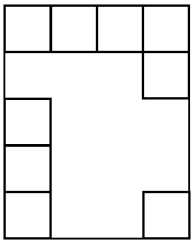
a. Draw lines so that the rectangle is completely filled with equal-sized squares.



b. Color the rows different colors.
c. How many rows?
d. How many squares in each row?
e. Write an equation to represent the sum of the rows.

2.

a. Draw lines so that the rectangle is completely filled with equal-sized squares.



b. Color the columns different colors.
c. How many columns?
d. How many squares in each column?
e. Write an equation that represents the sum of the columns.

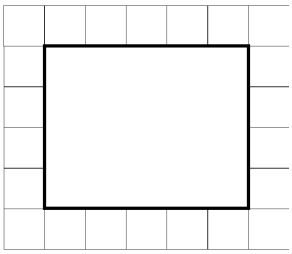
3.

a. Draw the lines so that the rectangle is completely filled with equal-sized squares.

- Give students access to red, blue, and green crayons or colored pencils and rulers.
- "In the first activity, you used tiles to make a rectangle and shaded in squares to represent it. In this activity you will start with a rectangle and decompose it into small equal-sized squares by drawing lines with a ruler. For each rectangle, there will be some squares already outlined. Draw lines to continue making equal-sized squares inside each rectangle."
- "After making the squares, use colored pencils or crayons to show patterns in the rows or columns."
- 10 minutes: quiet work time

Synthesis

- Display question 2.
- "How could you find the total number of squares that would fill this rectangle without drawing the lines?" (I can tell there will be 4 columns based on the top row. I can tell there will be 5 rows based on the first column, even though it is missing 1 square.)
- 30 seconds: quiet think time
- 30 seconds: partner discussion
- Share responses

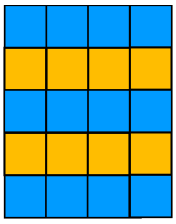


b. How many columns? How many squares in each column?
c. How many rows? How many squares in each row?
d. Write 2 equations to represent the number of squares in the rectangle.

Student Responses

1.

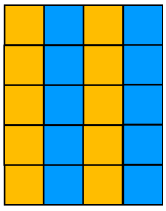
a.

b. 

c. 5 rows
d. 4 in each row
e. 4 + 4 + 4 + 4 + 4 = 20

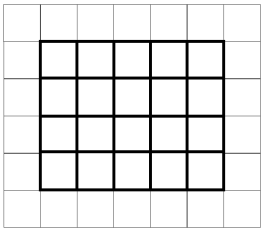
2.

a.

b. 

c. 4 columns
d. 5 in each column
e. 5 + 5 + 5 + 5 = 20

3.

a. 

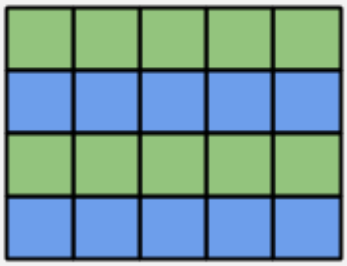
b. 5 columns and 4 squares in each column

c. 4 rows and 5 squares in each row

d. 4 + 4 + 4 + 4 + 4 = 20
5 + 5 + 5 + 5 = 20

Lesson Synthesis

"Today you learned that we can partition a rectangle into equal-sized squares."
Display image



"How would you describe this rectangle?" (It has 4 rows of squares. There are 5 squares in each row. It has 5 columns. There are 4 squares in each column.
"What is the total number of equal-sized squares inside the rectangle?"
30 seconds: quiet think time
1 minute: partner discussion
Share responses

2.7 Lesson 12: Partitioning Rectangles into Squares

Teacher-facing Learning Goals

- Partition rectangles into rows and columns comprised of equal-sized squares

Addressing CCSS: 2.OA.C.4, 2.G.A.2

Lesson Purpose

The purpose of this lesson is for students to partition rectangles into equal-sized squares.

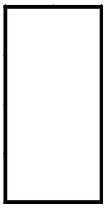
Materials Needed

Gather

- display Image (warm-up, Activity 1, lesson synthesis)
- Rulers
- tiles

Cool-down: How Many Squares?

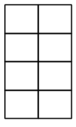
1. Split the rectangle into equal sized squares.



2. How many rows?
3. How many columns?
4. Write an equation that represents the number of squares in the rectangle.

Student Responses

Sample response:

1. 
2. 4 rows
3. 2 columns
4. 4 + 4 = 8 or 2 + 2 + 2 + 2 = 8

Teacher Reflection Question
How did the work of arranging objects to make arrays support the understanding of partitioning rectangles into equal-sized squares? What additional support is needed as students build this understanding?

Lesson Narrative

The **purpose** of this lesson is for students to partition rectangles into equal-sized squares. Students have arranged tiles to make arrays and rectangles, represented their rectangles by shading squares on a grid, and completed the partitioning of rectangles into squares. In this lesson, students partition rectangles into equal-sized squares with and without guiding marks and represent the total number of squares within the rectangles with equations that show the sum of the number of squares in the rows or the number of squares in the columns. It is not important for students to partition the rectangles into exactly equal-sized squares.

Access for Students with Disabilities	**Access for English Learners**
Activity 1: Engagement	Activity 1: MLR8 Discussion Supports

Student-facing Learning Goal: Let's partition rectangles into squares.

Warm-up Narrative: Estimation Exploration: Fill it Up

Addressing CCSS: 2.OA.C.4, 2.G.A.2
Building Towards CCSS: 3.MD.C

The **purpose** of this Estimation Exploration is to practice the skill of making a reasonable estimate. Students consider how the placement of the first 2 squares can help them think about the total number of squares needed to fill the rectangle. These understandings will be helpful later when students will need to partition rectangles into equal-sized squares.

Task Statement

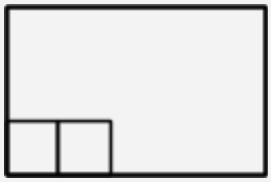
How many little squares would fill the rectangle?

Record an estimate that is:

too low	about right	too high

Launch/Activity

- Groups of 2
- Display image 1

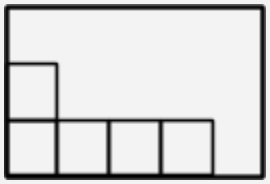


- "How many little squares would fill the rectangle?"
- "What is an estimate that's too high?" "Too low?" "About right?"

Student Responses

- 1-11 are too low.
- 12-20 are reasonable estimates.
- 21 and up would be too high because 3 rows of 7 or more would be a much bigger rectangle.

- 1 minute: quiet think time
- 1 minute: partner discussion
- Display image 2



- "Would you like to revise your thinking?"
- Share responses

Synthesis

- "How did the second image help you revise your thinking?"
- 30 seconds: quiet think time
- 1 minute: partner discussion
- Share responses.
- Consider asking, "How could you tell that 11 would not be a reasonable estimate?" (The bottom row already has 4, so the 2 bottom rows will have 10. It has to be more than 11 because there is another row to fill.)

Activity 1 Narrative: How Many Squares?

Addressing CCSS: 2.OA.C.4, 2.G.A.2

The **purpose** of this activity is for students to partition rectangles to create rows and columns of equal-sized squares. In the launch, students build an array with tiles and then represent it on a rectangle with tick marks as guidance. Students will partition rectangles without tick marks in the next activity.

SwD Support Tags

- Engagement

MLR Tags

- MLR8 Discussion Supports

EL Support Text

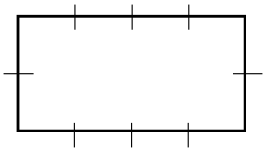
MLR8 Discussion Supports.

Synthesis: Some students may benefit from the opportunity to rehearse what they will say with a partner before they share with the whole class.
Advances: Speaking

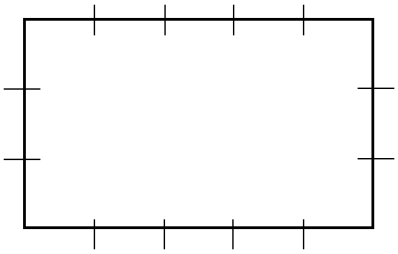
SwD Support Text
Engagement: Provide Access by Recruiting Interest
Activity:Leverage choice around perceived challenge. Invite students to select either rectangle 2 or rectangle 3 to complete after completing question 1.
Supports accessibility for: Organization; Attention; Social-emotional skills

Task Statement

1. Build a rectangle with 8 tiles arranged in 2 rows.

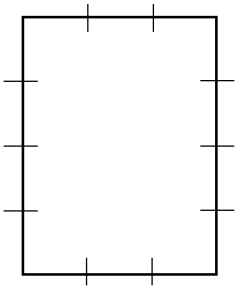


2. Use a ruler to partition the rectangles using the tick marks as a guide.



   a. How many rows?
   b. How many columns?
   c. Write 2 equations to represent the total number of squares.

3. Use a ruler to partition the rectangles using the tick marks as a guide.



Launch/Activity

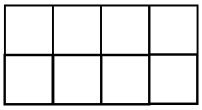
- Groups of 2
- Give students access to rulers and inch tiles.
- "Build a rectangle with 8 tiles. Your tiles should be in 2 rows."
- 1 minute: independent
- Share responses.
- "Now, draw lines in the rectangle to show the squares. It should have the same number of equal sized squares as the rectangle you made out of tiles. You may use a ruler if it helps you."
- 1 minute: independent work time
- "You will draw lines to partition 2 more rectangles into equal-sized squares. You can also use the tiles to build it first, if that helps."
- 10 minutes: quiet work time
- Monitor for students who partition the rectangle into "equal-sized" squares and write these equations: 4 + 4 = 8 or 2 + 2 + 2 + 2 = 8.

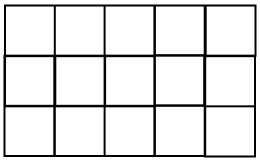
Synthesis

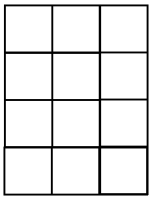
- Have selected students share their rectangles and equations for question 2. (3 + 3 + 3 + 3 + 3 = 15 or 5 + 5 + 5 = 15)

a. How many rows?
b. How many columns?
c. Write 2 equations to represent the total number of squares.

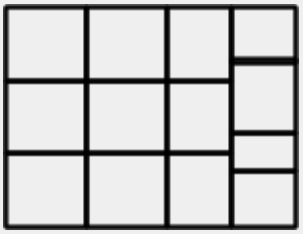
Student Responses

1. 

2. 
   a. 3 rows
   b. 5 columns
   c. 3 + 3 + 3 + 3 + 3 = 15
      5 + 5 + 5 = 15

3. 
   a. 4 rows
   b. 3 columns
   c. 4 + 4 + 4 = 12
      3 + 3 + 3 + 3 = 12

- Display image

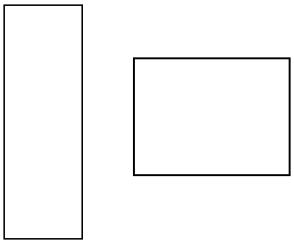
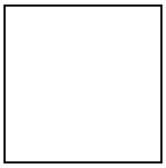


- "How is this partition different than what we did today?" (The squares aren't equal-sized and the last column has 4 not 3.)

Activity 2 Narrative: Partitioning Rectangles

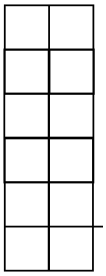
Addressing CCSS: 2.OA.C.4, 2.G.A.2

The **purpose** of this activity is for students to partition rectangles into rows and columns of equal-sized squares. Students use tiles to help them see how to draw lines to partition the rectangles. The purpose of the activity is to understand how to partition into equal-sized squares, but it is not necessary that students' drawings are very accurate, as long as they can articulate that the squares are all the same size.

Task Statement	**Launch/Activity**
1. Use 12 tiles to make a rectangle. a. Split one of the rectangles into equal-sized squares to match your rectangle made of tiles.  b. Write 2 equations to represent the total number of squares. 2. a. Split this rectangle into equal-sized squares.  b. Write 2 equations to represent the total number of squares. 3. a. Split this rectangle into equal-sized squares.  b. Write 2 equations to represent the total number of squares.	• Groups of 2 • Give students access to rulers. • Give each group access to tiles. • "You will be partitioning rectangles. For the first one, work with a partner to make a rectangle using tiles to help you plan, and then partition one of the rectangles to match." • 5 minutes: partner work time • Monitor for a group who used each of the rectangles. • Selected groups share. • "How did you decide which drawn rectangle to use to represent your tile rectangle?" (Our rectangle had 2 tiles in each row so we used the taller rectangle.) • "Could you have used the other rectangle?" (No, because the squares wouldn't be the same size." • 30 seconds: quiet think time • 1 minute: partner discussion • Share responses. • "For the next 2 rectangles, work on your own to partition them. Remember that all the squares should be the same size. After you are done, compare with your partner" • 6 minutes: independent work time. • Monitor for students who have a solid strategy for making equal-sized squares. Choose at least 1 student who thought about the number of squares first and 1 who drew the lines first and then counted the squares.

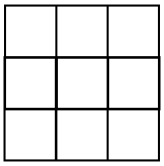
Student Responses

1. Sample response:



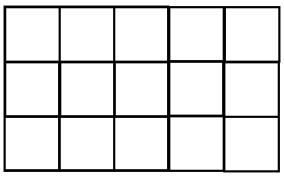
   a. 2 + 2 + 2 + 2 + 2 + 2 = 12
   b. 6 + 6 = 12

2.



   a. 3 + 3 + 3 = 9
   b. 3 + 3 + 3 = 9

3.

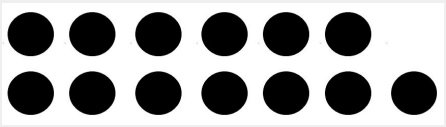


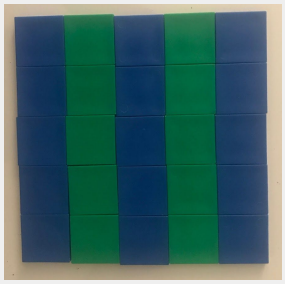
   a. 5 + 5 + 5 = 15
   b. 3 + 3 + 3 + 3 + 3 =15

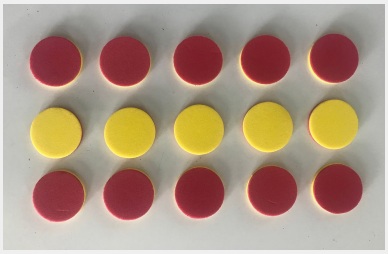
Synthesis

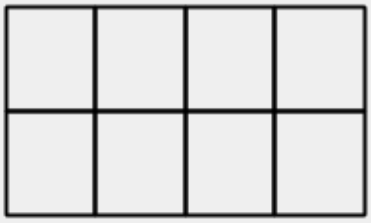
- Previously selected students share how they partitioned their rectangles.
- "What strategies did you use for making your squares all the same size?" (I knew I wanted ___ squares, so I did ___ lines across and down. I started by making my rows, then made the lines for the columns, and then saw how many squares it made.)

Lesson Synthesis

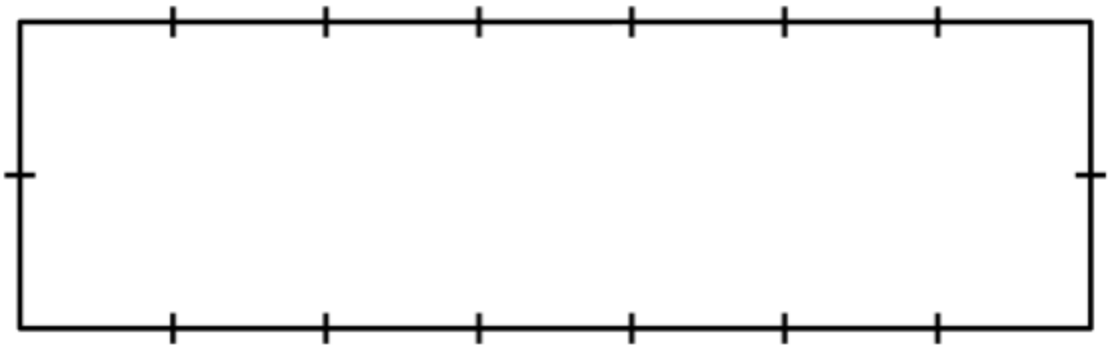
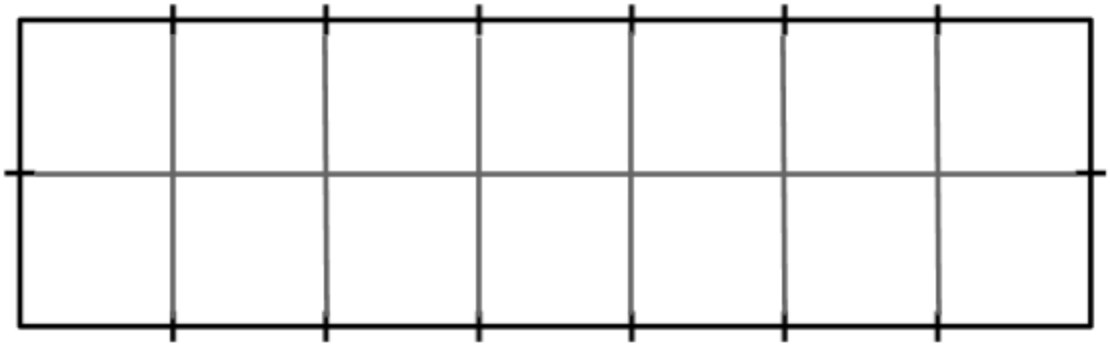








"In this unit you learned about even and odd numbers and different types of arrays. Looking at these images, think about 1 thing you could say about each one. What are some things that are the same or different?"
Display image
1 minute: quiet think time
1 minute: partner discussion
Share responses

Mini-Assessment	
CCSS	2.G.A.2 2.OA.C.4
Item Narrative	Students divide a rectangle into equal rows and columns with the scaffold of regularly spaced tick marks on the side of the rectangle. Then they find the number of squares the rectangle is divided into and write an expression for this using the row or column structure.
Item Statement	 1. Draw lines so the rectangle is completely filled with equal-sized squares. 2. Write an expression that represents the number of small squares.
Item Solution	1.  2. Sample response: 2 + 2 + 2 + 2 + 2 + 2 + 2 or 7 + 7.

Prior-grade Practice and Fluency Resources

Grade 2 Addition Number Talks

Find the value of each sum mentally. 4 + 8 + 2 4 + 5 + 3 + 2 9 + 3 + 1	Find the value of each difference mentally. 47 - 20 47 - 24 36 - 10 36 - 15
Find the value of each expression mentally. 8 + 2 18 + 2 18 + 5 23 - 5	Find the value of each sum mentally. 5 + 5 15 + 5 15 + 15 15 + 25
Find the value of each sum mentally. 7 + 3 7 + 13 7 + 33 17 + 23	Find the value of each difference mentally. 25 - 10 35 - 10 35 - 20 35 - 19
Find the value of each difference mentally. 40 - 20 6 - 3 46 - 23 46 - 13	Find the value of each difference mentally. 35 - 5 35 - 10 35 - 15 35 - 25
Find the value of each sum mentally. 10 + 6 9 + 6 9 + 4 8 + 5	Find the value of each expression mentally. 20 + 15 35 - 15 25 + 15 40 - 15
Find the value of each difference mentally. 21 - 6 31 - 11 25 - 7 35 - 17	Find the value of each sum mentally. 44 + 20 44 + 19 63 + 30 63 + 28
Find the value of each sum mentally. 120 + 20 120 + 200 124 + 30 124 + 300	Find the value of each sum mentally. 36 + 40 46 + 30 59 + 40 69 + 30

Grade 2 True or False - *Expressions Representing Arrays*

15 min

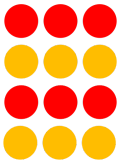
2.7 Lesson 10 Warm-Up

The **purpose** of this True or False is to elicit strategies and understandings students have for equal addend expressions. Arrays are displayed for the first 2 equations as a support for students to explain how they know the expressions are equal. Students have an opportunity to look for and make use of structure (MP7) because they can see that 3 twos or 3 groups of 2 and 2 threes or 2 groups of 3 would have the same value based on their experiences with the array structure.

Task Statement

Is each statement true or false? Be prepared to explain your reasoning.

- 2 + 2 + 2 = 3 + 3



- 4 + 4 + 4 = 3 + 3 + 3 + 3
- 5 + 5 + 5 = 3 + 3 + 3

Student Responses

- True. 2 + 2 + 2 = 6 and 3 + 3 = 6
- True. There are 3 fours and 4 threes, just like in the array. They are the same. The total for both is 12.
- False. 3 fives and 3 threes wouldn't be the same amount.

Launch/Activity

- Display one problem.
- "Give me a signal when you know whether the equation is true and can explain how you know."
- 1 minute: quiet think time
- Share and record answers and strategy.
- Repeat with each problem.

Synthesis

- Display image

- "How could we make this statement true based on this array? Explain." (To make this true we need 3 + 3 + 3 + 3 + 3. I know that if 5 + 5 + 5 means 3 columns of 5, there would be 5 rows of 3.)

Grade 2 True or False - *Two or False*	
10 min	**2.7 Lesson 13 Warm-Up** The **purpose** of this True or False is to elicit strategies and understandings students have for finding sums with multiples of 2 and 2 equal addends. These understandings help students deepen their understanding of the properties of operations, fluency within 20, and will be helpful practice as students develop foundations for multiplication.

Task Statement

Is each statement true or false? Be prepared to explain your reasoning.

2 + 2 + 2 + 2 = 4 + 4

2 + 2 + 2 = 3 + 3

2 + 2 + 2 + 2 + 2 + 2 = 5 + 5

Student Responses

- True. Possible response: On the left side, you can do 2 + 2 two times to make 4 + 4.
- True. Possible response: You could split one 2 into 1 + 1 and add 1 to each other 2. 2 + 1 + 2 + 1 = 3 + 3
- False. Possible response: I saw I could do 2 + 2 three times to make 4 + 4 + 4 and I know this is more than 5 + 5.

Launch/Activity

- Display one problem.
- "Give me a signal when you know whether the equation is true and can explain how you know."
- 1 minute: quiet think time
- Share and record answers and strategy.
- Repeat with each problem.

Synthesis

- "How can you justify your answer without solving both sides?"

Grade 2 Choral Count - *Counting from 0 to 20*

10 min

The **purpose** of this Choral Count is to invite students to practice counting by ones, fives, and tens from 0 to 20 and notice patterns in the count, as represented by jumps on the number line. These understandings help students develop fluency and will be helpful in later lessons when students will need to be able to represent addition and subtraction on the number line.

In this activity, students have an opportunity to notice and make use of structure (MP7) because they notice patterns across the counts and see a visual representation to support their thinking.

Task Statement

N/A

Student Responses

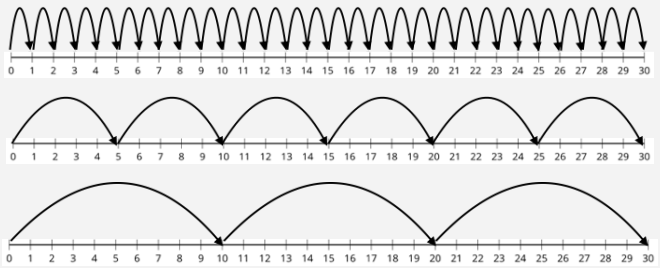
Record responses:
Write out numbers: 0-20
0, 5, 10, 15, 20.
0, 10, 20.

Launch/Activity

- "Count by ones, starting at 0."
- Record as students count.
- Stop counting and recording at 20
- "Count by fives, starting at 0."
- Record as students count.
- Stop counting and recording at 20
- "Count by tens, starting at 0."
- Record as students count.
- Stop counting and recording at 20
- "What patterns do you see?"
- 1-2 minutes: quiet think time
- Record responses.

Synthesis

- Display image. (number lines in student materials)



- What do you notice on these number lines representing the counts? (Start and end at the same number, the tape diagrams are longer when counting by fives or tens)
- 30 seconds: quiet think time
- 1 minute: partner discussion
- Share responses.

Grade 2 Choral Count - *Skip Count by 2*

10 min

The **purpose** of this Choral Count is to invite students to practice counting by 2 and notice patterns in the count. Although students are not required by the standard to count by 2, this warm-up allows students to pay attention to patterns that will be helpful later in the lesson when students determine and justify whether a group of objects is even or odd.

Task Statement

N/A

Student Responses

- Record count:

2	12	22	32
4	14	24	34
6	16	26	36
8	18	28	38
10	20	30	40

- Sample responses:
  - If you look across, the number in the ones place is the same in each number.
  - Each group (column) shows 2, 4, 6, 8, 0 in the ones place.
  - After we say 8, we count a new ten.
  - The last number in each is a ten. We counted to 4 tens.

Launch/Activity

- Count by 2, starting at 2.
- Record as students count.
- Stop counting and recording at 40.
- "What patterns do you see?"
- 1-2 minutes: quiet think time
- Record responses.

Synthesis

- "Who can restate the pattern in different words?"

Extension and Exploration Resources

Center: Equal Groups Concentration (Stage 3)

Teacher-facing Learning Goals

- Match arrays to equal addend expressions.

Look Fors

- Students can correctly match an array to an equal addend expression.
- Students can explain how the addends in an expression match the rows or columns in an array.
- Students can fluently find sums within 20.

Student-facing Learning Goal: Let's match arrays to equal addend expressions.

Materials Needed

Copy

- Prepare cards from Equal Groups Concentration Stage 3 blackline masters for each pair of students.

Student-facing Directions and Task	Teacher Directions
Task statement • Place the cards upside down in 3 rows with 4 cards in each row. • Choose two cards. • If the two cards are a match, explain how they match and find the sum. Go again. • If the cards aren't a match, put them back where they were. • Player to collect the most pairs wins.	**Center Directions** • Groups of 2 • Give cards to each pair of students. • Shuffle the cards and place them upside down in 3 rows with 4 cards in each row. • Choose two cards. If they match, explain to your partner how they match. • Keep the pair of cards and go again (up to 2 times). • If the cards are not a match, put them back where they were. • The player with the most pairs of cards at the end wins. **Questions to ask during center** • "How does this array match this expression?" • "Where do you see the addends in the array?"

IM task: Partitioning a Rectangle into Unit Squares

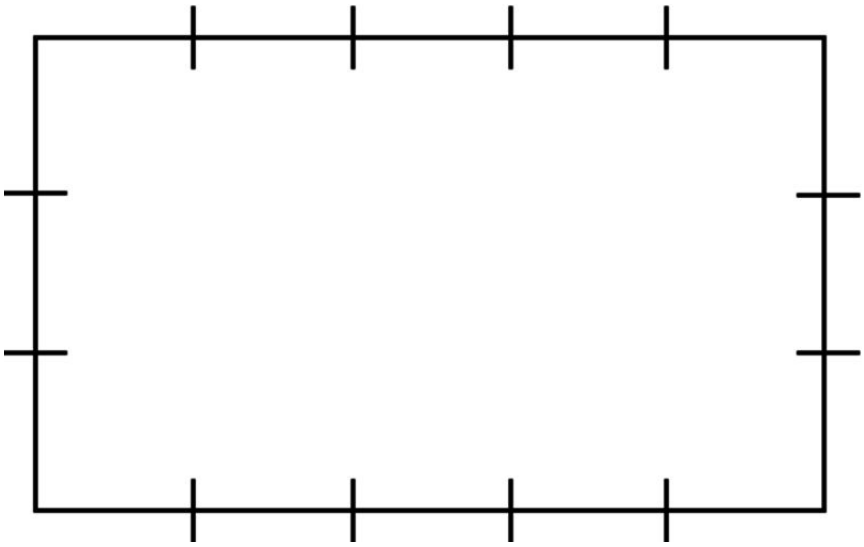
Materials

- Copies of a rectangle with edges marked (one for each student)
- A straight edge tool

Actions

The teacher should guide students through these actions, as the text in this task is too complex for some second graders.

a. Draw a grid on the rectangle by connecting each mark to the one directly across from it on the opposite edge.



b. The grid separates the rectangle into many little squares. How many squares are there?

c. There are five little squares in each row. Count by fives to find how many squares there are in the entire rectangle.

d. What other methods can you think of to quickly count how many squares there are in the entire rectangle?

e. Write a number in each little square to count them and show that your answers are correct.

f. One number sentence which shows the total number of squares is 3 + 3 + 3 + 3 + 3 = 15. Write

another number sentence which shows the total number of squares.

IM Commentary

The purpose of this task is to show the student that a rectangle can be partitioned into unit squares, and that there are a number of reasonable ways to count the resulting squares.

The third part encourages the student to count by fives, as called for by 2.NBT.2, and makes the connection between the equal-sized groups and area of a rectangle representations for multiplication, which will be developed in third grade. Counting by numbers other than five is not called for by the standards, but would be a nice additional outcome.

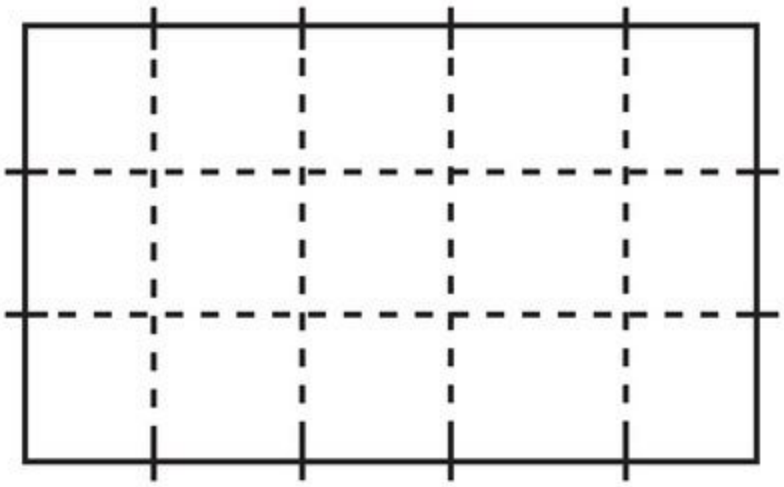
Many extensions are possible:

- Inviting students to make their own rectangle with a grid of a size of their choosing.
- To learn about world cultures as well as mathematics, one can take the opportunity to explore game boards with this kind of shape. In particular, Snakes and Ladders is a game which has been played around the world. (Commercially, Chutes and Ladders in the U.S. is based on it). See the Wikipedia page on Snakes and Ladders for more information.

  Students could make their own game with different-sized rectangular boards and different ways to navigate them, reinforcing the fact that there are different ways to count and all ways give the same answer (connecting 2.G.A.2 with K.CC.4.B). Playing such games can develop skills in estimation, the relationship between multiplication and division, and probability, setting the ground for a wide range of later work.
- Investigating which numbers can be represented as the total number of squares in some grid. Even at this grade level, some students may take an interest in numbers which can only be made by a grid with side length one (that is, prime numbers).

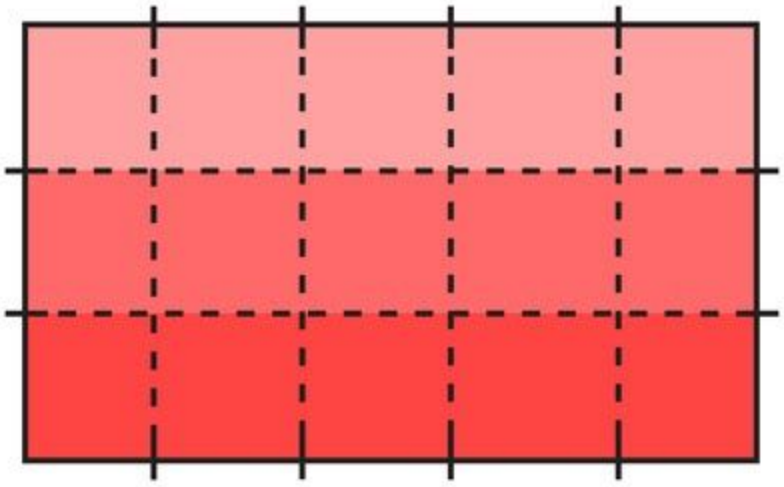
Students need to experience partitioning rectangles themselves to understand area. If students have not yet done this, then they should do the partitioning themselves. However, if the students are already proficient with partitioning and understand that the squares taken together constitute the larger rectangle, then they can start with a pre-partitioned rectangle.

Solutions

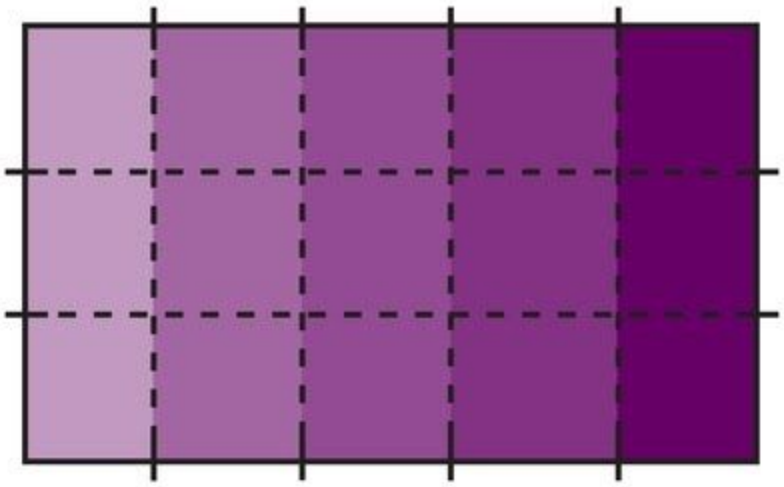
a. 

b. For this particular example, there are fifteen little squares.

c. There are five little squares in each row. To find the total amount, the student can count by fives: five, ten, fifteen. Since the student has already counted that there are a total of fifteen squares, they can feel confident that counting by fives is giving them the correct number of squares. Compare with standard 2.OA.C.4



d. The student might also notice that there are three little squares in each column. To find the total amount, the student can count by threes: three, six, nine, twelve, fifteen. Counting by numbers other than five, while not strictly necessary in a task at this grade level, nonetheless provides a foundation for working on multiplication in third grade.



e.

Students can label the squares in different ways. In particular, it might be helpful for the student to make a few copies of their grid and try a few different labeling schemes.
To reinforce counting by the number of squares in each column, the teacher might encourage the student to label the top row with the numbers 1 through 5, the second row with the numbers 6 through 10, and the third row with the numbers 11 through 15.
To reinforce counting by the number of squares in each column, the teacher might encourage the student to label the leftmost column with the numbers 1 through 3, the second column with the numbers 4 through 6, and so forth.

f. Another number sentence which can be used is 5 + 5 + 5 = 15. While others are possible, including for example 9 + 6 = 15 (breaking it up into a familiar square and six more blocks) and 1 + 1 + … + 1 = 15, number sentences which describe breaking up by rows or columns are the desired and most likely responses.

2.8 Lesson 9: Make Your Own Number Talk

Teacher-facing Learning Goals

- Add and subtract within 100 fluently.
- Explain why methods for adding and subtracting within 100 work.

Building on CCSS: 2.NBT.B.5, 2.NBT.B.9

Lesson Purpose

The purpose of this lesson is for students to apply their understanding of addition and subtraction to create a Number Talk activity.

Materials Needed

Gather	**Copy**
• none	• none

Cool-down: Looking for Patterns

Mathematicians look for patterns and things that repeat over and over.

When did you find a pattern today? What did you notice?

Student Responses

Answers vary. Sample response: When I was making Number Talks I was looking for ways each expression was alike. I was looking for ways someone could use the same method to find each value.

Teacher Reflection Question

What did you learn about students' mathematical understandings today as you listened to their discussions?

Lesson Narrative

This lesson offers teachers the opportunity to listen to ways in which students make use of structure and repeated reasoning to design a Number Talk. Students may come up with different expressions to use in the Number Talk, which is fine. The point of the lesson is not to design the perfect Number Talk, but instead for students to reason about the structure of numbers.

After the warm-up, four activities are given, but it is not expected that students do all four. As the activities progress, there is one additional problem missing from each Number Talk. The choice of which activities to use is left to the teacher based on how much scaffolding the students may need. This lesson can take 1–2 days if students facilitate their creations with other groups.

The cool-down should be completed before the Lesson Synthesis so that students can share their responses during the Lesson Synthesis.

Access for Students with Disabilities	**Access for English Learners**
Activity 1: Engagement	Activity 1: MLR8 Discussion Supports

Student-facing Learning Goal: Let's create a Number Talk.

Warm-up Narrative: Number Talk: Addition	**Addressing CCSS:** 2.NBT.B.7

The purpose of this Number Talk is to elicit strategies and understandings students have for adding within 1,000. These understandings help students develop fluency and will be helpful later in this lesson when students will develop their own Number Talk activity.

In this activity, students have an opportunity to look for and make use of structure (MP7) because they consider how place value can be used to add. In the synthesis students discuss things the writer had to pay attention to when they designed this activity to prepare them for the work in the rest of the lesson.

Task Statement	**Launch/Activity**
Find the value of each sum mentally. 20 + 50 300 + 400 320 + 450 324 + 455 **Student Responses**	• Display one problem. • "Give me a signal when you have an answer and can explain how you got it." • 1 minute: quiet think time • Record answers and strategy. • Keep problems and work displayed. • Repeat with each problem. **Synthesis**

• 70: I know that 2 tens and 5 tens is 7 tens. I just know it. • 700: I know that 3 hundreds and 4 hundreds is 7 hundreds. • 770: I added the hundreds to get 700, and the tens to get 70. The sum is 770. • 779: I added the hundreds, the tens, then the ones to get 779.	• **"**What did the writer of this activity have to pay attention to when they designed this activity?" • "Where do we see those things in how the expressions change during the Number Talk?"
Activity 1 Narrative: Design 1	**Addressing CCSS:** 2.NBT.B.5
Activity Purpose The purpose of this activity is for students to reason about subtraction to create one new expression to a partially-completed Number Talk activity. If there is time, students can facilitate their Number Talk with another group.	
SwD Support Tags • Engagement	
MLR Tags • MLR8 Discussion Supports	
EL Support Text *MLR8 Discussion Supports* Synthesis: At the appropriate time, give students 2–3 minutes to make sure that everyone in their group can explain the reasoning. Invite groups to rehearse what they will say when they share with the whole class. *Advances: Speaking, Conversing, Representing*	
SwD Support Text *Engagement: Develop Effort and Persistence* Activity: Invite students to generate a list of shared expectations for group work. Record responses on a display and keep visible during the activity and activity 2. *Supports accessibility for: Social-Emotional Functioning*	
Task Statement Write an expression to complete the Number Talk.	**Launch/Activity** • Groups of 2 or 4

60 - 40
60 - 39
50 - 39
_____

Student Responses
Answers vary. Sample responses:

- 50 - 38. I changed the 39 to be one less. It's still close to 40, so you can think about taking away 40, but add 2 more.
- 40 - 39. I changed the 50 to be 40. You can think about how the difference is 10 less than before. It's 11 instead of 21.
- 60 29. I changed the 50 to 60 and the 39 to 29. You can think about taking away 30 and adding 1.

- "Now you will work with your group to complete a Number Talk activity. This activity has 1 expression missing. First, find the difference of each expression. Then, decide on an expression that could complete the Number Talk and write it on the blank line."
- 10 minutes: small group work time
- As students work, monitor for groups who discuss and design an expression based on some of the following:
  - They adjust the 39 to a different number, but keep the 50.
  - They leave the 39, but adjust the 50.
  - They adjust the 50 and the 39, but create a problem where a similar strategy can be used.

Synthesis

- Selected groups share different reasons for their fourth expression.
- Ask students to share their completed Number Talk and ask the class to share reasons for the last expression.
- As each group shares, continually ask others in the class if they agree or disagree and the reasons why.

Activity 2 Narrative: Design 2

Addressing CCSS: 2.NBT.B.5

Activity Purpose
The purpose of this activity is for students to reason about the relationship between addition and subtraction to create two new expressions for a partially-completed Number Talk activity. If there is time, students can facilitate their Number Talk with another group.

Task Statement

Write expressions to complete the Number Talk.

Launch/Activity

- Groups of 2 or 4

54 + 19 73 - 54 _____ _____ **Student Responses** Answers vary. Sample responses: ● 73 - 19, 19 + 54. I made 2 more expressions that use the same 3 numbers that are in the first 2 expressions. ● 56 + 29, 85 - 56. I made 2 more expressions that are like the first two. You have to add, then subtract. The sum of the first expression is the first number in the second expression.	● "Now you will work with your group to complete a Number Talk activity. This activity has 2 expressions missing. First, find the difference of each expression. Then, decide on expressions that would complete the Number Talk and write them in the blank lines." ● 10 minutes: small group work time ● As students work, monitor for groups who discuss and design expressions based on some of the following: ○ They leave the 73, but adjust the 54 to 19. ○ They leave the 54, but adjust the 73 to 19 and change the expression to addition. ○ They adjust the 54 and the 19, but create two new expressions that follow the same pattern as the first two. **Synthesis** ● Selected groups share different reasons for their expressions. ● Ask students to share their completed Number Talk and ask the class to share reasons for their expressions. ● As each group shares, continually ask others in the class if they agree or disagree and the reasons why.
Activity 3 Narrative: Design 3	**Addressing CCSS:** 2.NBT.B.5

Activity Purpose The purpose of this activity is for students to reason about subtraction to create three new expressions to a partially-completed Number Talk activity. If there is time, students can facilitate their Number Talk with another group.

Task Statement

Write expressions to complete the Number Talk.

90 - 40

_____

_____

_____

Student Responses

Answers vary. Sample responses:

- 92 - 40, 95 - 40, 52 - 40. I changed the first number but kept subtracting 40. You can take away 4 tens each time.
- 90 - 39, 90 - 29, 90 - 19. I only changed the second number. You can think about taking away 40 and add 1, then take away 30 and add 1, and then take away 20 and add 1.
- 80 - 40, 40 - 30, 60 - 20. I changed the numbers but they are all differences you can find by taking away tens from tens.

Launch/Activity

- Groups of 2 or 4
- "Now you will work with your group to complete a Number Talk activity. This activity has 3 expressions missing. Decide on expressions that would complete the Number Talk and write them on the blank lines."
- 10 minutes: small group work time
- As students work, monitor for groups who discuss and design expressions based on some of the following:
  - They adjust the 90 to emphasize a certain strategy.
  - They adjust the 40 to emphasize a certain strategy.
  - They make slight adjustments throughout the Number Talk, but keep problems that use a certain strategy.

Synthesis

- Selected groups share different reasons for their expressions.
- Ask students to share their completed Number Talk and ask the class to share reasons for their expressions.
- As each group shares, continually ask others in the class if they agree or disagree and the reasons why.

Activity 4 Narrative: Design 4

Addressing CCSS: 2.NBT.B.5

Activity Purpose
The purpose of this activity is for students to reason about subtraction to add two expressions to a partially-completed Number Talk activity. If there is time, students can facilitate their Number Talk with another group.

Task Statement

Write expressions to complete the Number Talk.

_____

_____

_____

_____

Student Responses
Answers vary. Sample responses:

- 324 + 300, 324 + 20, 234 + 4, 234 + 325. I made a number talk that first adds some hundreds, then some tens, then some ones, then adds them as one number.
- 85 - 20, 85 - 19, 850 - 200, 850 - 199. I made a number talk to practice thinking about numbers that are close to help subtract.
- 30 - 29, 50 - 48, 70 - 67, 72 - 69. I made a number talk with numbers that are close together on the number line, so you can think about counting up.

Launch/Activity

- Groups of 2 or 4
- "Now you will work with your group to complete a Number Talk activity. This activity has all the expressions missing. Decide on expressions that would complete a Number Talk and write them on the blank lines."
- 10 minutes: small group work time
- As students work, monitor for groups who discuss and design expressions based on a clear theme such as:
  - adding hundreds to hundreds, tens to ten, and ones to one
  - using place value benchmarks like a multiple of 100 or 10 to make adding or subtracting easier
  - adding on to find difference

Synthesis

- Selected groups share different reasons for their expressions.
- Ask students to share their completed Number Talk and ask the class to share reasons for their expressions.
- As each group shares, continually ask others in the class if they agree or disagree and the reasons why.

Lesson Synthesis
"Share your work from the cool-down."
1 minute: partner discussion
Share responses.