



# Equal Groups



## Teacher Guide



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# Equal Groups

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**Equal Groups**  
**Teacher Guide**  
Core Knowledge Mathematics™



# Unit 8: Equal Groups

## At a Glance

Unit 8 is estimated to be completed in 12-15 days including 2 days for assessment.

This unit is divided into two sections including 10 lessons and 3 optional lessons.

- Section A—Odd and Even (Lessons 1-6)
- Section B—Rectangular Arrays (Lessons 7-13)

On pages 6-7 of this Teacher Guide is a chart that identifies the section each lesson belongs in and the materials needed for each lesson.

This unit uses four student centers.

- Target Numbers
- Five in a Row; Addition and Subtraction
- How Close?
- Write Numbers



## Unit 8: Equal Groups

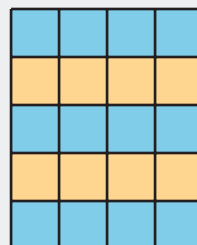
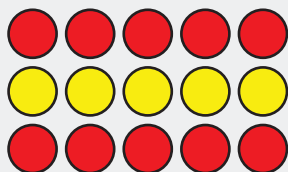
### Unit Learning Goals

- Students work with equal groups of objects to gain foundations for multiplication.

In this unit, students develop an understanding of equal groups, building on their experiences with skip-counting and with finding the sums of equal addends. The work here serves as the foundation for multiplication and division in grade 3 and beyond.

Students begin by analyzing even and odd numbers of objects. They learn that any even number can be split into 2 equal groups or into groups of 2, with no objects left over. Students use visual patterns to identify whether numbers of objects are even or odd.

Next, students learn about rectangular arrays. They describe arrays using mathematical terms (rows and columns). Students see the total number of objects as a sum of the objects in each row and as a sum of the objects in each column, which they express by writing equations with equal addends. They also recognize that there are many ways of seeing the equal groups in an array.



Later, students transition from working with arrays containing discrete objects to equal-size squares within a rectangle. They build rectangular arrays using inch tiles and partition rectangles into rows and columns of equal-size squares. The work here sets the stage for the concept of area in grade 3.

## Section A: Odd and Even

### Standards Alignments

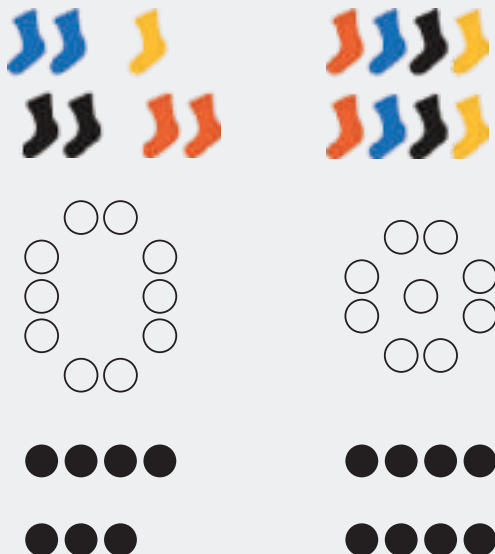
Building On	2.OA.B.2
Addressing	2.NBT.A.2, 2.NBT.B.7, 2.NBT.B.8, 2.OA.B.2, 2.OA.C, 2.OA.C.3
Building Towards	2.OA.C.3, 2.OA.C.4

### Section Learning Goals

- Determine whether a group of objects (up to 20) has an odd or even number of members.
- Write an equation to express an even number as a sum of two equal addends.

In this section, students learn about odd and even numbers, building on their experience with sharing objects with another person or with making pairs out of a set of objects. They begin by noticing that some groups of objects can be made into two equal groups without a “leftover” and other groups can be made into two equal groups with “1 leftover.” The same pattern can be seen when pairing objects.

After learning the terms, students focus on explaining why a group has an even number or an odd number of members. They do so by showing whether the objects can be made into two equal groups or be paired without a leftover, or whether they can skip-count by 2 to count the entire collection.



The representations used here support students as they progress from explaining even and odd numbers informally to doing so more formally. They also pave the way for students to make sense of representations of multiplication in grade 3.

Early lessons encourage the teacher to record student thinking using diagrams of equal groups or by arranging objects in rows and columns. Both recording strategies help students see and count pairs of objects.

Students begin to see how objects arranged in rows and columns can show equal groups or pairs. They will learn more about this arrangement and the term “array” in the next section.

To focus the work on building a foundation for multiplication and division, counters or connecting cubes should be available to students throughout the section, including during cool-downs.

 PLC: Lesson 3, Activity 2, Card Sort: Even or Odd

## Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Supporting)
- How Close? (1–5), Stage 4: Add to 1,000 (Supporting)

## Section B: Rectangular Arrays

### Standards Alignments

Addressing 2.G.A.2, 2.NBT.A.2, 2.NBT.B.7, 2.OA.B.2, 2.OA.C.3, 2.OA.C.4

Building Towards 2.G.A.2, 3.MD.C, 3.OA.A.1

### Section Learning Goals

- Find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns using addition.
- Partition rectangles into rows and columns of equal-size squares, and count to find the total number of squares.
- Represent the total number of objects in an array as a sum of equal addends.

In this section, students learn that a rectangular array contains objects arranged into rows and columns, with the same number of objects in each row and the same in number in each column.

Using this structure, students can skip-count by the number in each row or in each column to find the total number of objects. They can also write equations with equal addends representing the number of objects in a row or a column.

Later in the section, students relate their work with arrays to the partitioning of shapes into equal parts.

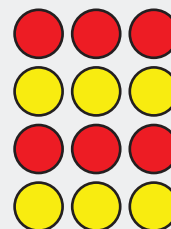
*True or false?*

$$2 + 2 + 2 = 3 + 3$$



*True or false?*

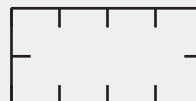
$$3 + 3 + 3 + 3 = 4 + 4$$



Students build rectangles by arranging square tiles into rows and columns, and then partition rectangles into rows and columns.

*Use 8 tiles to build a rectangle. Arrange them in 2 rows.*

*Partition this rectangle to match the rectangle you made.*



Rectangles in this section have up to 5 rows and 5 columns. Students are not expected to name the fractional units created by partitioning shapes. The focus is on using the structure of the rows and columns created by the partitions to count the total number of equal-size squares. This work serves as a foundation for students' future study of multiplication and area measurement.

PLC: Lesson 9, Activity 1, Sums of Rows and Sums of Columns

## Suggested Centers

- Write Numbers (1–2), Stage 4: Skip Count by 2, 5, and 10 (Addressing)
- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)

## Throughout the Unit

Throughout this unit, students are supported with instructional routines to develop an understanding of equal groups. Number Talk routines in the first section allow students an opportunity to continue to develop fluency within 20, as they connect even and odd numbers to facts with 2 equal addends (doubles) and facts with addends that have a difference of 1.

The True or False routines in Section B support students as they write equations to represent the amount of objects in an array. Students recognize that an array can be represented by different expressions, depending on whether you are counting the number in each row, or in each column.

Here is a sampling of the warm-up routines in this unit.

lesson 4	lesson 6	lesson 13
Number Talk	Number Talk	True or False
$6 + 6$	$2 + 2 + 2$	$2 + 2 + 2 + 2 = 4 + 4$
$7 + 7$	$2 + 2 + 2 + 2$	$2 + 2 + 2 = 3 + 3$
$7 + 8$	$2 + 2 + 2 + 2 + 2$	$2 + 2 + 2 + 2 + 2 + 2 = 5 + 5$
$8 + 9$	$2 + 2 + 2 + 2 + 2 + 2$	

## Materials Needed

LESSON	GATHER	COPY
A.1	<ul style="list-style-type: none"> <li>● Connecting cubes or counters</li> </ul>	<ul style="list-style-type: none"> <li>● none</li> </ul>
A.2	<ul style="list-style-type: none"> <li>● Chart paper</li> <li>● Connecting cubes or counters</li> <li>● Counters</li> </ul>	<ul style="list-style-type: none"> <li>● none</li> </ul>
A.3	<ul style="list-style-type: none"> <li>● Counters</li> <li>● Crayons</li> </ul>	<ul style="list-style-type: none"> <li>● Even and Odd Card Sort (groups of 1)</li> </ul>
A.4	<ul style="list-style-type: none"> <li>● Counters</li> </ul>	<ul style="list-style-type: none"> <li>● none</li> </ul>
A.5	<ul style="list-style-type: none"> <li>● Counters</li> </ul>	<ul style="list-style-type: none"> <li>● Presto Chango Recording Sheet (groups of 1)</li> </ul>
A.6	<ul style="list-style-type: none"> <li>● Dry erase markers</li> <li>● Materials from previous centers</li> <li>● Sheet protectors</li> </ul>	<ul style="list-style-type: none"> <li>● Write the Number Stage 4 Gameboard (groups of 2)</li> </ul>
B.7	<ul style="list-style-type: none"> <li>● Counters</li> </ul>	<ul style="list-style-type: none"> <li>● none</li> </ul>
B.8	<ul style="list-style-type: none"> <li>● Counters</li> </ul>	<ul style="list-style-type: none"> <li>● none</li> </ul>
B.9	<ul style="list-style-type: none"> <li>● Counters</li> </ul>	<ul style="list-style-type: none"> <li>● Match Arrays to Expressions Card Sort (groups of 2)</li> </ul>
B.10	<ul style="list-style-type: none"> <li>● Counters</li> </ul>	<ul style="list-style-type: none"> <li>● none</li> </ul>
B.11	<ul style="list-style-type: none"> <li>● Colored pencils or crayons</li> <li>● Inch tiles</li> <li>● Rulers</li> </ul>	<ul style="list-style-type: none"> <li>● none</li> </ul>
B.12	<ul style="list-style-type: none"> <li>● Inch tiles</li> <li>● Rulers</li> </ul>	<ul style="list-style-type: none"> <li>● none</li> </ul>

B.13

- Materials from previous centers
- none

## Center: Target Numbers (1–5)

### Stage 6: Add Hundreds, Tens, or Ones

#### Activities

- Grade2.8.A6.2 (supporting)
- Grade2.8.B13.1 (supporting)

#### Stage Narrative

Students add hundreds, tens, and ones to get as close to 1,000 as possible. Students start by rolling three number cubes to get a starting number. Then, they take turns rolling the three cubes to create a number to add. For each number they roll, they choose whether they want it to represent hundreds, tens, or ones. Students add their hundreds, tens, and ones to the starting number. The sum becomes the first addend in the next round. The player who gets closest to 1,000 in 6 rounds, without going over, is the winner.

#### Standards Alignments

Addressing 2.NBT.B.7, 2.NBT.B.8, 3.NBT.A.2

#### Materials to Gather

Number cubes

#### Materials to Copy

Target Numbers Stage 6 Recording Sheet (groups of 1)

#### Additional Information

Each group of 2 needs three number cubes.

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## Stage 7: Subtract Hundreds, Tens, or Ones

### Lessons

- Grade2.8.A1 (supporting)
- Grade2.8.A2 (supporting)
- Grade2.8.A3 (supporting)
- Grade2.8.A4 (supporting)
- Grade2.8.A5 (supporting)
- Grade2.8.B7 (supporting)
- Grade2.8.B8 (supporting)
- Grade2.8.B9 (supporting)
- Grade2.8.B10 (supporting)
- Grade2.8.B11 (supporting)
- Grade2.8.B12 (supporting)

### Activities

- Grade2.8.A6.2 (supporting)
- Grade2.8.B13.1 (supporting)

### Stage Narrative

Students subtract hundreds, tens, and ones to get as close to 0 as possible. Students start their first equation with 1,000 and take turns rolling three cubes to get a number to subtract. For each number they roll, they choose whether they want it to represent hundreds, tens, or ones. Students subtract their hundreds, tens, and ones from the starting number. The difference becomes the first number in the next equation. The player who gets closest to 0 in 6 rounds, without going below 0, is the winner.

### Standards Alignments

Addressing 2.NBT.B.7, 2.NBT.B.8, 3.NBT.A.2

### Materials to Gather

Number cubes

### Materials to Copy

Target Numbers Stage 7 Recording Sheet (groups of 1)

### Additional Information

Each group of 2 needs three number cubes.

## Stages used in Grade 1

### Stage 1

#### Addressing

- Grade1.5.B

#### Supporting

- Grade1.5.C
- Grade1.6.A
- Grade1.6.B
- Grade1.7.B
- Grade1.7.C

### Stage 2

#### Addressing

- Grade1.5.B

#### Supporting

- Grade1.5.C
- Grade1.6.A
- Grade1.6.B
- Grade1.7.B
- Grade1.7.C

### Stage 3

#### Addressing

- Grade1.5.C

#### Supporting

- Grade1.6.A
- Grade1.6.B
- Grade1.7.B
- Grade1.7.C

---

## Center: Five in a Row: Addition and Subtraction (1–2)

### Stage 7: Add within 1,000 without Composing

#### Activities

- Grade2.8.A6.2 (supporting)
- Grade2.8.B13.1 (supporting)

#### Stage Narrative

Partner A chooses two numbers and places a paper clip on each number. They add the numbers and place a counter on the sum. Partner B moves one of the paper clips to a different number, adds the numbers, and places a counter on the sum. Students take turns moving one paper clip, finding the sum, and covering it with a counter.

#### Standards Alignments

Addressing 2.NBT.B.7

#### Materials to Gather

Paper clips, Two-color counters

#### Materials to Copy

Five in a Row Addition and Subtraction Stage 7 Gameboard (groups of 2)

#### Additional Information

Each group of 2 needs 25 counters and 2 paper clips.

### Stage 8: Add within 1,000 with Composing

#### Lessons

- Grade2.8.A1 (supporting)
- Grade2.8.A2 (supporting)
- Grade2.8.A3 (supporting)
- Grade2.8.A4 (supporting)
- Grade2.8.A5 (supporting)

#### Activities

- Grade2.8.A6.2 (supporting)
- Grade2.8.B13.1 (supporting)

---

## Stage Narrative

Partner A chooses two numbers and places a paper clip on each number. They add the numbers and place a counter on the sum. Partner B moves one of the paper clips to a different number, adds the numbers, and places a counter on the sum. Students take turns moving one paper clip, finding the sum, and covering it with a counter.

## Standards Alignments

Addressing 2.NBT.B.7

## Materials to Gather

Paper clips, Two-color counters

## Materials to Copy

Five in a Row Addition and Subtraction Stage 8 Gameboard (groups of 2)

## Additional Information

Each group of 2 needs 25 counters and 2 paper clips.

## Stages used in Grade 1

### Stage 1

#### Addressing

- Grade1.1.A
- Grade1.1.B
- Grade1.1.C
- Grade1.3.D

#### Supporting

- Grade1.4.A
- Grade1.4.B
- Grade1.4.C
- Grade1.5.A
- Grade1.5.B
- Grade1.5.C
- Grade1.6.A
- Grade1.6.B

## Stage 2

### Addressing

- Grade1.1.A
- Grade1.1.B
- Grade1.1.C
- Grade1.3.D

### Supporting

- Grade1.4.A
- Grade1.4.B
- Grade1.4.C
- Grade1.5.A
- Grade1.5.B
- Grade1.5.C
- Grade1.6.A
- Grade1.6.B

## Stage 3

### Addressing

- Grade1.3.C
- Grade1.3.D

### Supporting

- Grade1.4.A
- Grade1.4.B
- Grade1.4.C
- Grade1.5.A
- Grade1.5.B
- Grade1.5.C
- Grade1.6.A
- Grade1.6.B

## Stage 4

### Addressing

- Grade1.4.A
- Grade1.4.B

### Supporting

- Grade1.5.A
- Grade1.5.B
- Grade1.5.C
- Grade1.6.A
- Grade1.6.B

## Stage 5

### Addressing

- Grade1.5.A
- Grade1.5.B
- Grade1.5.C

### Supporting

- Grade1.6.A
- Grade1.6.B

## Stage 6

### Addressing

- Grade1.5.C

### Supporting

- Grade1.6.A
- Grade1.6.B

## Center: How Close? (1–5)

### Stage 4: Add to 1,000

#### Lessons

- Grade2.8.A1 (supporting)
- Grade2.8.A2 (supporting)
- Grade2.8.A3 (supporting)
- Grade2.8.A4 (supporting)
- Grade2.8.A5 (supporting)

#### Activities

- Grade2.8.A6.2 (supporting)
- Grade2.8.B13.1 (supporting)

#### Stage Narrative

Before playing, students remove the cards that show 10 and set them aside.

Each student picks 8 cards and chooses 6 of them to create 2 three-digit numbers. Each student adds the numbers. The score for the round is the difference between each student's sum and 1,000. Students pick new cards so that they have 8 cards in their hand and then start the next round. The player with the lowest score wins.

This center stage is the first time Number Cards 0–10 are used in Grade 3, so they are provided as a Instructional master. Students will continue to use these throughout the year. Consider copying them on cardstock or laminating them and keeping them organized to be used repeatedly.

#### Standards Alignments

Addressing 2.NBT.B.7, 3.NBT.A.2

#### Materials to Copy

How Close? Stage 4 Recording Sheet (groups of 1),  
Number Cards (0-10) (groups of 2)

## Stages used in Grade 1

### Stage 1

#### Addressing

- Grade1.3.C
- Grade1.3.D

#### Supporting

- Grade1.4.A
- Grade1.4.B
- Grade1.6.B
- Grade1.7.A

### Stage 2

#### Addressing

- Grade1.3.D

#### Supporting

- Grade1.4.A
- Grade1.4.B
- Grade1.6.B
- Grade1.7.A

### Stage 3

#### Addressing

- Grade1.6.A
- Grade1.6.B

#### Supporting

- Grade1.7.A

## Center: Write Numbers (1–2)

### Stage 4: Skip Count by 2, 5, and 10

#### Lessons

- Grade2.8.B7 (addressing)
- Grade2.8.B8 (addressing)
- Grade2.8.B9 (addressing)
- Grade2.8.B10 (addressing)
- Grade2.8.B11 (addressing)
- Grade2.8.B12 (addressing)

#### Activities

- Grade2.8.A6.1 (addressing)
- Grade2.8.A6.2 (addressing)
- Grade2.8.B13.1 (addressing)

#### Stage Narrative

Students choose to start with 2, 5, or 10. They skip count by that number.

#### Standards Alignments

Addressing 2.NBT.A.2

#### Materials to Gather

Dry erase markers, Sheet protectors

#### Materials to Copy

Write the Number Stage 4 Gameboard (groups of 2)

### Stages used in Grade 1

#### Stage 1

##### Addressing

- Grade1.4.B
- Grade1.4.C

##### Supporting

- Grade1.6.C

## Stage 2

### Addressing

- Grade1.4.B
- Grade1.4.C

### Supporting

- Grade1.6.C

## Stage 3

### Addressing

- Grade1.6.C

## Section A: Odd and Even

### Lesson 1: Can You Share?

#### Standards Alignments

Addressing 2.OA.C  
Building Towards 2.OA.C.3

#### Teacher-facing Learning Goals

- Determine whether a group of objects can be arranged into 2 equal groups.

#### Student-facing Learning Goals

- Let's share groups of objects equally with a partner.

#### Lesson Purpose

The purpose of this lesson is for students to arrange a number of objects into 2 equal groups and learn that some numbers of objects can be put into two equal groups without any objects left over.

In this lesson, students learn that some numbers of objects can be split into two equal groups, without any objects left over, and other numbers cannot. The work of this lesson builds on students' real-world experiences with equal sharing and prepares them to understand and use the terms even and odd to describe groups of objects in future lessons (MP6). In the first activity, students separate objects into 2 equal groups and begin to create a list of numbers that can be split into 2 equal groups. In the second activity, they are given access to objects, but are also encouraged to consider other representations of numbers, including equations, that may show a number of objects as 2 equal groups or 2 equal groups and 1 leftover.

Students should have access to objects (connecting cubes or counters) throughout the lesson, including the cool-down.

#### Access for:

##### Students with Disabilities

- Action and Expression (Activity 1)

#### Instructional Routines

MLR8 Discussion Supports (Activity 1), Notice and Wonder (Warm-up)

## Materials to Gather

- Connecting cubes or counters: Activity 1, Activity 2

## Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

## Teacher Reflection Question

What ideas did students already have about the number of objects that can be made into equal groups? How did you elicit and use these ideas during the lesson?

## Cool-down (to be completed at the end of the lesson)

🕒 5 min

Share with Your Partner

### Standards Alignments

Addressing 2.OA.C

### Student-facing Task Statement

Noah and Lin want to share 11 connecting cubes equally. How many will each student get? Will there be any leftovers?

Show your thinking using diagrams, symbols, or other representations. You may use cubes if it helps.

### Student Responses

Sample responses:

- Student draws and labels to show 2 equal groups of 5 and 1 leftover.
- $11 = 5 + 5 + 1$ . Noah and Lin get 5 cubes each and 1 cube is left over.

----- Begin Lesson -----

## Warm-up

🕒 10 min

Notice and Wonder: Sharing is Caring

### Standards Alignments

Building Towards 2.OA.C.3

The purpose of this warm-up is to elicit students' personal experiences with equal sharing, which will be useful when students create equal groups of objects in the lesson activities. Although students may notice and wonder many things about the image, comments and questions about the number of children, number of objects, and ways to resolve the problem with equal shares are the important discussion points.

### Instructional Routines

Notice and Wonder

### Student-facing Task Statement

What do you notice? What do you wonder?



### Student Responses

Students may notice:

- There are two children.
- There are 2 stuffed animals.
- The children are both pulling on one dinosaur.

Students may wonder:

- Are they fighting over the dinosaur?
- Why are they fighting over the dinosaur?
- Why don't they each play with one stuffed animal?

### Launch

- Groups of 2
- Display the image.
- "What do you notice? What do you wonder?"
- 1 minute: quiet think time

### Activity

- "Discuss your thinking with your partner."
- 1 minute: partner discussion
- Share and record responses.

### Synthesis

- "If these children are fighting over the toy, how could they resolve their problem?" (One could play with the other toy, so they both have one to play with. They could take turns playing with the dinosaur.)
- "Today we are going to look at ways to share groups of objects equally."

- Why don't they play with both of the stuffed animals together?

## Activity 1

🕒 20 min

### My Fair Share

#### Standards Alignments

Addressing 2.OA.C  
Building Towards 2.OA.C.3

The purpose of this activity is for students to share a collection of objects with a partner so that both students receive the same amount and as many objects as possible. They separate groups of objects into 2 equal groups and identify numbers of objects that can be split into 2 equal groups with “no leftovers” and those that can be split into two equal groups with “some leftovers.” In the synthesis, students discuss that numbers with “some leftovers” can only have 1 leftover. Create a t-chart that lists the numbers that students find for each category. Students will add more to the t-chart in the next lesson.

When students notice that some collections of objects can be shared equally while others can not they observe an important mathematical structure (MP7) which they will name in a future lesson.

This activity uses MLR8 Discussion Supports. Advances: speaking

#### ♿ Access for Students with Disabilities

*Action and Expression: Develop Expression and Communication.* Give students access to 10-frame mats to place the cubes on. When the cubes are arranged by two (up and down) it is very clear when there is a leftover.

*Supports accessibility for: Organization, Visual-Spatial Processing*

#### Instructional Routines

MLR8 Discussion Supports

#### Materials to Gather

Connecting cubes or counters

## Required Preparation

- Each group of 2 needs a container of counters with 4 to 15 counters in each container. These containers will be used again in the next lesson.
- Create a t-chart on a large piece of chart paper to display in the activity synthesis.
- Use “Two Equal Groups” as the title.
- Label the t-chart with “no leftovers” and “some leftovers” as the categories.

## Student-facing Task Statement

Choose a container of counters. Share the counters equally with your partner. Then complete the table to show the total number of objects and how many you each received.

total	my share	my partner's share	number of leftovers

## Student Responses

Sample response:

total	my share	my partner's share	number of leftovers
6	3	3	0
15	7	7	1
9	4	4	1
8	4	4	0
12	6	6	0

## Launch

- Groups of 2
- Give each group 1 container of objects.

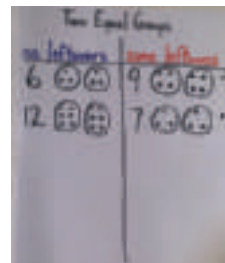
## Activity

- “Share the objects in your container with your partner so that you each get the same amount and as many as possible.”
- “Record the total number of objects that were in your container.”
- “Then record the number of objects in your share and in your partner’s share. If there are any left over, record the number in the chart.”
- Demonstrate with the dinosaur example from the warm-up as needed.
- “When you finish sharing the objects in one container, pack up the objects and trade with another group.”
- 10 minutes: partner work time

## Synthesis

- Display t-chart labeled “Two Equal Groups” with “no leftovers” and “some leftovers” as the categories.
- Invite students to share a total amount and whether they made 2 equal groups with no leftovers or 2 equal groups with some leftovers.
- Record the total in the appropriate column of the chart.

- Ask students to share the number in their share and in their partner's share. Record by drawing a circle around each share. For example:



- Repeat to gather 2–3 examples of even and 2–3 examples of odd numbers.
- “Look at the numbers in each group. What do you notice? What do you wonder?” (I notice all the numbers show two equal groups. I notice there’s only ever one leftover. I notice some numbers have the same equal groups, like 6 has 2 groups of 3 and 7 has 2 groups of 3. I wonder why there’s only ever one leftover.)

### MLR8 Discussion Supports

- Before students share, remind students to use words such as equal groups and leftovers.
- 1 minute: quiet think time
- 1–2 minutes: partner discussion
- Share responses.
- If needed, “How many leftovers did each number have?”
- “Whenever we put objects into 2 equal groups, we will either have 0 leftovers or 1 leftover.”

## Activity 2

Share the Marbles

🕒 15 min

## Standards Alignments

Addressing	2.OA.C
Building Towards	2.OA.C.3

The purpose of this activity is for students to determine whether the objects in a group can be separated into two equal groups. Students work with larger numbers of objects (16–20) than they did in the previous activity. They should be given access to counters (or other physical objects), but may use different ways to represent the number of objects and possible groups, including diagrams and equations.

## Materials to Gather

Connecting cubes or counters

## Student-facing Task Statement

Andre has a collection of 17 marbles. He wants to play a game with his sister. They both need to start with the same number of marbles and they want to use as many as they can.



1. How many marbles would Andre and his sister get? Would there be any marbles left out of the game? Show your thinking.
2. What if Andre had 18 marbles? How many would each person get? Would there be any marbles left out? Show your thinking.
3. What if Andre had 20 marbles? How many would each person get? Would there be any marbles left out?

## Student Responses

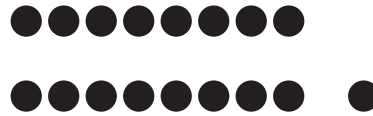
1. Andre and his sister each get 8 marbles. There is 1 leftover.
2. Andre and his sister each get 9 marbles. There wouldn't be any left over.

## Launch

- Groups of 2
- Give students access to connecting cubes or counters.
- “Andre has a collection of 17 marbles. He wants to play a game with his sister. To play, they both need to start with the same number of marbles and they want to use as many as they can.”
- “Use the counters, diagrams, symbols or other representations to show how they could start the game.”
- 2 minutes: independent work time
- Monitor for different ways students group the counters or objects in the diagrams they create.
- “Compare your thinking with your partner.”
- 1 minute: partner discussion
- Invite previously identified students to share their solutions. Display or record their grouping strategy.
- Display or draw:

$$17 = 8 + 8 + 1$$

3. Andre and his sister each get 10 marbles.  
There would be 0 left over.



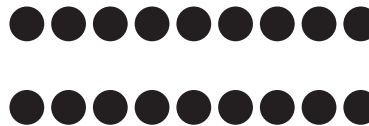
- “How does the equation represent this diagram?” (17 is the total amount. Each 8 shows the group of 8 on top and the group of 8 on the bottom and his sister got the same amount. The + 1 shows the marble that is left out.)

### Activity

- “Work with your partner to answer the other questions about Andre’s marbles.”
- 8 minutes: partner work time

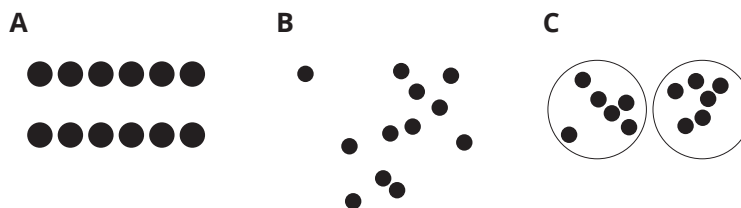
### Synthesis

- Invite 1–2 students to share their response for 18 marbles.
- Display a student representation or draw:



- “How did you use your work for sharing 18 marbles to find out how to share 20 marbles?” (20 is just 2 more than 18 so each group would get 1. There wouldn’t be any left over.)
- Display a student representation for 20 marbles or draw to show adding 1 marble to each group to the drawing of 18 marbles.
- “What equation can we write to represent the diagram?” ( $10 + 10 = 20$ )

Draw 12 circles or arrange 12 counters in the following configurations:



“Which representations help you see if 12 blocks could be split into two equal groups?” (A because you can see that they each have the same amount because there are two groups and the circles in each group are matched up. C because you can see the 2 groups and there are the same amount in each group.)

### Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Supporting)
- How Close? (1–5), Stage 4: Add to 1,000 (Supporting)

### ----- Complete Cool-Down -----

#### Response to Student Thinking

Students create equal groups that are smaller than 5 and have more than 1 leftover or have 2 groups that aren't equal.

#### Next Day Support

- Before the warm-up, have students work in partners to discuss a correct response to this cool-down.

## Lesson 2: Partners Make Pairs

### Standards Alignments

Addressing 2.OA.C, 2.OA.C.3

### Teacher-facing Learning Goals

- Determine if a group of objects can be arranged into groups of 2.

### Student-facing Learning Goals

- Let's make pairs with groups of objects.

### Lesson Purpose

The purpose of this lesson is for students to pair all of the objects in a group and understand that some numbers of objects can be paired without any objects left over.

In a previous lesson, students determined whether a group of objects could be split into 2 equal groups and discovered that for some numbers of objects, there will be 1 leftover.

In this lesson, students learn that some numbers of objects can be split into multiple groups of 2 (pairs) without any incomplete pairs. In the lesson synthesis, students compare the charts from this lesson and the previous lesson that show no leftovers or one leftover. They notice that the lists of numbers are the same. The terms **even** and **odd** are introduced and added to the charts.

Students should have access to connecting cubes or counters throughout the lesson, including the cool-down.

### Access for:

#### Students with Disabilities

- Engagement (Activity 2)

### Instructional Routines

MLR8 Discussion Supports (Activity 1), Which One Doesn't Belong? (Warm-up)

### Materials to Gather

- Chart paper: Activity 1
- Connecting cubes or counters: Activity 2
- Counters: Activity 1

**Lesson Timeline**

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

**Teacher Reflection Question**

What was the best question you asked students today? Why would you consider it the best one based on what students said or did?

**Cool-down** (to be completed at the end of the lesson)

🕒 5 min

Everybody Find a Partner

**Standards Alignments**

Addressing 2.OA.C.3

**Student-facing Task Statement**

Nine students need to pair up to play a game. Will everyone have one partner?

Show your thinking using a diagram, symbols, or other representations.

**Student Responses**

No. Sample responses:

- Students draw 9 shapes and group them by 2 showing that 1 will be left over.
- There will be 4 pairs and one person will not have a partner.

----- **Begin Lesson** -----

**Warm-up**

🕒 10 min

Which One Doesn't Belong: Laundry Day

## Standards Alignments

Addressing 2.OA.C

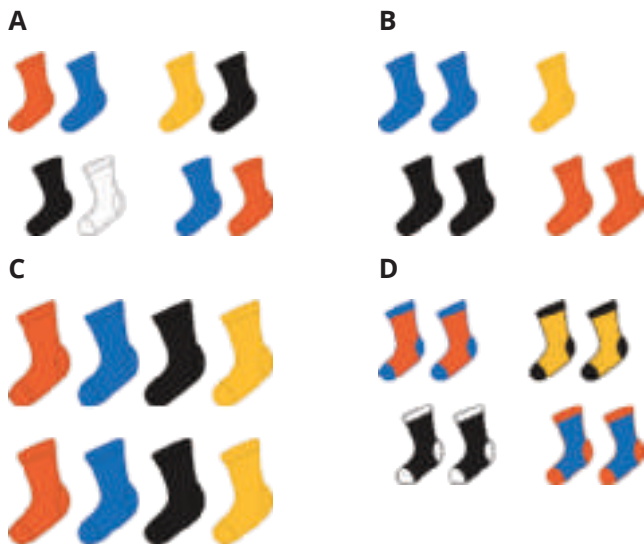
This warm-up prompts students to compare four images. It gives the teacher an opportunity to hear how students use terminology and talk about an equal group of 2 objects as a pair. This language will be important as students pair objects during the lesson and reason about even and odd throughout the section.

## Instructional Routines

Which One Doesn't Belong?

### Student-facing Task Statement

Which one doesn't belong?



### Student Responses

Sample responses:

- A is the only one that doesn't show pairs of socks that match.
- B is the only one that doesn't have complete pairs of socks. It's the only one that doesn't have 8 socks.
- C is the only one that doesn't have pairs of socks separated out.
- D is the only one that doesn't have socks with

### Launch

- 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

### Activity

- "Discuss your thinking with your partner."
- 2-3 minutes: partner discussion
- Record responses.

### Synthesis

- "How does each image show pairs of socks?" (Sample responses: A shows 4 pairs side-by-side, but they don't match. B shows 3 pairs of socks that are the same color and right next to each other. C shows socks in 2 rows. The matching pairs are above and below each other. D shows matching pairs side-by-side.)

solid colors.

## Activity 1

🕒 20 min

Pair Up

### Standards Alignments

Addressing 2.OA.C.3

The purpose of this activity is for students to separate objects into groups of 2 and identify numbers of objects that can be split into pairs with “no leftovers” and numbers of objects that can be split into pairs with “one leftover.” In the synthesis, create a t-chart with students that lists the numbers that belong to each category. Students share what they notice and wonder about each group of numbers. Save the t-chart for use in the lesson synthesis.

When recording student responses in the synthesis, record how students counted to find the total number of counters by drawing pairs in rows (see activity synthesis). This helps students see the groups of 2 and prepares them for analyzing arrays in future lessons.

This activity uses MLR8 Discussion Supports. Advances: speaking.

### Instructional Routines

MLR8 Discussion Supports

### Materials to Gather

Chart paper, Counters

### Required Preparation

- Each group of 2 needs a container of 4 to 15 counters.
- Create a t-chart on a large piece of chart paper to display in the activity synthesis.
- Use “Making Pairs” as the title.
- Label the t-chart with “no leftovers” and “one leftover” as the categories.

### Student-facing Task Statement

Make pairs with 1 yellow counter and 1 red

### Launch

- Groups of 2

counter.

my counters

total  
counters

leftover  
counters

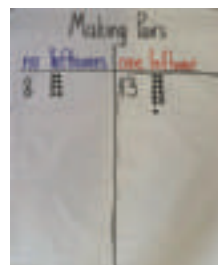
- Give each group a bag of counters.

### Activity

- “Work with your partner to make as many pairs of 1 red and 1 yellow counter that you can. Represent your counters with a drawing or symbols in the first column.”
- “Record the total amount of counters and the number of counters left over, after you have made pairs.”
- “When you finish pairing the counters in one bag, pack up the counters and trade with another group.”
- 10 minutes: partner work time

### Synthesis

- Display t-chart labeled “Making Pairs” with “no leftovers” and “one leftover” as the categories.
- Invite students to share a total amount and whether they made pairs with no leftovers or pairs with a leftover.
- Record the total on the chart.
- “How did you count the counters to find the total?” (I counted each pair by 2.)
- Represent how the student counted by drawing dots in rows. If students count by 2, represent this by drawing two dots at a time and count by 2.
  - For example:



### Student Responses

Answers vary. Sample responses:

- “Look at the numbers in each group. What do you notice? What do you wonder?” (All

- Student draws 7 groups of 2 circles for 14 counters with 0 leftover counters.
- Student draws 2 rows of 5 circles and uses a line to connect the circles in pairs. One circle has no pair for a total of 11 counters with 1 leftover counter.
- Student draws 3 rows of circles. The first two rows have 2 circles and 1 row has 1 circle for 5 counters with 1 leftover counter.

of the numbers show pairs. The numbers in the leftover group have only 1 leftover, the rest make pairs. I wonder what other numbers go in these groups. I wonder if these are the same numbers we found had 1 leftover yesterday.)

### MLR8 Discussion Supports

- Before students share, remind students to use words such as pairs, equal groups, and leftovers.
- 1 minute: quiet think time
- 1-2 minutes: partner discussion
- Share responses.
- If needed, “How many leftovers did each number have?”

### Advancing Student Thinking

If students make 2 equal groups of counters and the arrangement does not clearly show pairs of red and yellow counters. Consider asking:

- “How does your arrangement show a pair of counters that has 1 red and 1 yellow?”
- “How could you rearrange your counters to show pairs?”

## Activity 2

🕒 15 min

Are You Feeling Left Out?

### Standards Alignments

Addressing 2.OA.C.3

The purpose of this activity is for students to determine whether a group of people (16–20) can be organized into groups of 2 without any person left alone or any groups of 3. They begin to reason about whether a group of objects is even or odd by using what they know about counting or

adding by 2 (MP7, MP8). Students should be given access to counters, but may use other representations, including equations.

### Access for Students with Disabilities

*Engagement: Internalize Self-Regulation.* Provide students an opportunity to self-assess and reflect on their own progress. For example, ask them if there is a pattern they notice or something they see that relates to pairing. Another option is to have students explain what happens in their own classroom when pairing up for group work. “What if someone does not have a partner?”

*Supports accessibility for: Conceptual Processing, Social-Emotional Functioning*

## Materials to Gather

Connecting cubes or counters

### Student-facing Task Statement

Show your thinking using diagrams, symbols, or other representations. Use cubes or counters if it helps.

1. There are 18 students in Clare’s class today. They will work in pairs. Will everyone be in a group of 2?
2. There are 20 students in Priya’s class. Will everyone be in a group of 2?
3. There are 19 students in Noah’s class. Will everyone be in a group of 2?

### Student Responses

1. Yes. Sample responses:
  - Student draws 9 groups of 2 objects and labels to show they counted 18.
  - 2, 4, 6, 8, 10, 12, 14, 16, 18
2. Yes. Sample response:
  - Student draws 10 rows of 2 objects and labels to show they counted 20.
  - Student uses their previous drawing and adds 1 more group of 2.
3. No. Sample response:

### Launch

- Groups of 2
- Give students access to connecting cubes or counters.
- Have students pair up to find a new partner or line up in pairs.
- “Does everyone have a partner?”
- “When we need a partner for an activity, are we always able to have only groups of 2?” (No. When \_\_\_ was absent, we had to make a group of 3.)

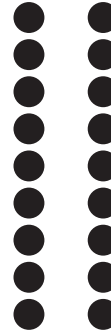
### Activity

- “Let’s show whether all students in different class sizes can be paired up to make only groups of 2.”
- “Do the first question on your own.”
- 3 minutes: independent work time
- “Compare your thinking with your partner. Then answer numbers 2 and 3 together.”
- 8 minutes: partner work time
- Monitor for different ways students show pairs for 19 students to share in the synthesis.

- It's one less than Priya's class, so that would mean 1 person would not be in a group of 2.

### Synthesis

- Draw or display:



- “How could we use this representation to show whether everyone in Noah’s class will have a partner?” (There are 18 circles and you can see they are in pairs. 19 is one more than 18. So, one circle would be left out).
- Share responses. Include reasoning from previously selected students.

## Lesson Synthesis

🕒 10 min

Display t-chart from the last activity and the t-chart created in the previous lesson.

“What do you notice about the numbers in each chart? What do you wonder?” (I notice the numbers in the “no leftovers” group are the same on both charts. Both charts have a group that has numbers with one leftover and the numbers are the same on both charts. What other numbers go in these groups? Why are the same numbers split up in different categories on both charts? Do these numbers have a special name?)

“When the number of objects can be split into two equal groups or made into pairs without any objects left over, we say the number is **even**.”

“Numbers that are not even are called **odd**. When we try to make two equal groups of objects but there’s one left over, there is an odd number of objects. If we try to put objects into pairs but we have one left over, there is an odd number of objects.”

Add the words even and odd to each chart above the appropriate category.

## Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Supporting)
- How Close? (1–5), Stage 4: Add to 1,000 (Supporting)

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## Complete Cool-Down

### Response to Student Thinking

Students say that all students will have a partner and show 1 group of 3 students.

### Next Day Support

- Launch Warm-up or Activity 1 by highlighting key vocabulary from previous lessons.

## Lesson 3: Is it Odd or Even?

### Standards Alignments

Addressing 2.OA.C.3

Building Towards 2.OA.C.3

### Teacher-facing Learning Goals

- Determine whether representations of groups of objects show an even or odd number of objects.

### Student-facing Learning Goals

- Let's explain why the number of objects in a group is even or odd.

### Lesson Purpose

The purpose of this lesson is for students to determine whether representations of groups of objects show an even or odd number of objects.

In a previous lesson, students learned the terms even and odd and saw that if a group has an even number of objects, it can be separated into two equal groups and that each object can be paired with another object.

In this lesson, students justify why a number is even or odd using methods based on making two equal groups, pairing objects, or skip-counting by 2. Some students may begin to justify why a group of objects has an even or odd number of members by using equations with two equal addends to represent even numbers of objects. In the second activity, they interpret addition equations in this way and connect the equations to representations of 2 equal groups (MP2).

### Access for:

#### Students with Disabilities

- Action and Expression (Activity 1)

### Instructional Routines

Card Sort (Activity 2), Choral Count (Warm-up), MLR8 Discussion Supports (Activity 2)

### Materials to Gather

- Counters: Activity 1
- Crayons: Activity 1

### Materials to Copy

- Even and Odd Card Sort (groups of 1): Activity 2

**Lesson Timeline**

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

**Teacher Reflection Question**

Reflect on whose thinking was heard today. Reflect on whose thinking was not heard but could have enriched the conversations. What prompts or structures might better enable the latter to share their voices and reasoning?

**Cool-down** (to be completed at the end of the lesson)

🕒 5 min

Even or Odd?

**Standards Alignments**

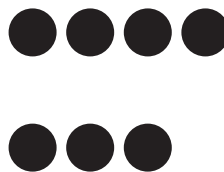
Addressing 2.OA.C.3

**Student-facing Task Statement**

1. Is the total number of balloons even or odd? Explain how you know.



2. Is the number of dots even or odd? Explain how you know.



## Student Responses

1. Even. Sample responses:

- The number of balloons is even. You can see that both groups are the same.
- The number of balloons is even. You can pair the balloons that are the same color without any left over.

2. Odd. Sample responses:

- The number of dots is odd. There is one group of 4 on top and another group of 3. You cannot make two equal groups.
- The number of dots is odd. There are 3 pairs and 1 dot that would be left over.

---

## Begin Lesson

## Warm-up

🕒 10 min

Choral Count: Skip Count by 2

### Standards Alignments

Building Towards 2.OA.C.3

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.

### Instructional Routines

Choral Count

#### Student Responses

- Record the count in columns with the first column being 2, 4, 6, 8, 10. Line up the ones and tens digits to make the pattern visually obvious.

#### Launch

- "Count by 2, starting at 2."
- Record as students count.
- Stop counting and recording at 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 the next ten.
  - The last number in each group (column) is a ten. We counted to 4 tens.

### Activity

- “What patterns do you see?”
- 1–2 minutes: quiet think time
- Record responses.

### Synthesis

- “Who can restate the pattern in different words?”

## Activity 1

🕒 15 min

### Color by Number

#### Standards Alignments

Addressing 2.OA.C.3

The purpose of this activity is for students to determine whether a group of objects is even or odd. The context and the structure of the images allow students to look for ways to make 2 equal groups (1 yellow group and 1 blue group) or make pairs (1 yellow and 1 blue). Students are given access to yellow and blue crayons or colored pencils, but are not required to color the designs. Some students might be able to answer all of the questions without coloring.

Students who color the images or pair them in an organized fashion are determining whether there are an even or odd number by finding a visual structure in the collection of images (MP7).

#### 🕒 Access for Students with Disabilities

*Action and Expression: Internalize Executive Functions.* Check for understanding by inviting students to rephrase what the words even and odd mean. Refer back to the t-chart that has been made in previous lessons.

*Supports accessibility for: Memory, Organization*

#### Materials to Gather

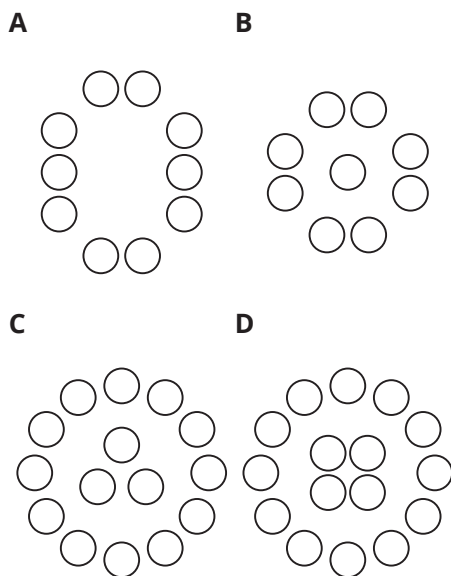
Counters, Crayons

## Required Preparation

- Each group of 2 needs access to counters and blue and yellow crayons or colored pencils.

## Student-facing Task Statement

Han wants to color a design with the same number of yellow and blue shapes.



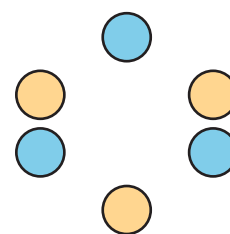
- Which designs could Han choose? Show your thinking using diagrams, symbols, or other representations. Use counters if it helps.
- Draw a circle design that would work for Han and a circle design that would not work.
- Priya drew a design that has 6 circles, 3 triangles, and 3 squares. Would Han be able to color it the way he wants? Show your thinking using diagrams, symbols, or other representations. Use counters if it helps.

## Student Responses

- A and D. Sample response: Students show groups of 2 or 2 equal groups with no leftovers for A and D.
- Sample responses:

## Launch

- Groups of 2
- Give students access to counters and yellow and blue crayons or colored pencils.
- Display or draw:



- “What do you notice? What do you wonder?” (There are 6 circles. There are 3 yellow circles and 3 blue circles. I wonder if it’s a pattern - yellow, blue, yellow, blue, yellow, blue)
- 30 seconds: quiet think time
- 1 minute: partner discussion
- Share responses.

## Activity

- “Han wants to color other designs so that he has the same number of yellow circles and blue circles.”
- “Use the design, symbols, or your own representations to figure out which designs Han should pick. Be ready to share your thinking with your partner.”
- 5 minutes: independent work time
- Monitor for students who:
  - color or label with color names
  - find 2 equal groups
  - pair shapes

- Students draw a design like Choice A with 12 circles as a design that would work.
  - Students draw a circle pattern with 5 circles as a design that would not work.
3. Sample response:
- Yes. He could color the 6 circles yellow and the 3 triangles and 3 squares blue. 3 and 3 are the same as 6.

- 3 minutes: partner discussion

### Synthesis

- “Which designs have an even number of shapes? Explain how you know.” (A and D because there is an equal number of yellow and blue. A and D because every yellow circle can be paired with a blue circle.)
- “Does Priya’s design have an even or odd number of shapes? Explain how you know.” (Even. You could make 2 equal groups of shapes. You could pair each circle with another shape.)

### Advancing Student Thinking

If students match or draw designs with an odd number of shapes, consider asking:

- “What must be true about the number of yellow and blue shapes after Han colors a design?”
- “How do you know this design will match what Han is looking for?”

## Activity 2

 20 min

Card Sort: Even or Odd

   PLC Activity

### Standards Alignments

Addressing 2.OA.C.3

The purpose of this activity is for students to determine and justify why a representation shows an even or odd number of objects. They connect equations to visual representations and use them to reason about even and odd numbers (MP2). Although some images may be designed to elicit reasoning about 2 equal groups or pairs of objects, students should be encouraged to explain their thinking using the method that makes the most sense to them.

This activity uses MLR8 Discussion Supports. Advances: speaking, listening, conversing

## Instructional Routines

Card Sort, MLR8 Discussion Supports

## Materials to Copy

Even and Odd Card Sort (groups of 1)

### Required Preparation

- Create a set of cards from the Instructional master for each group of 2.

### Student-facing Task Statement

1. Sort your cards into a group that shows an even number and a group that shows an odd number.

Explain your thinking to your partner.

2. Find 3 cards that show the same number. Explain to your partner how each card shows whether the number is even or odd in a different way.

### Student Responses

1.
  - Even: A, E, H, J, K, M, O, P
  - Odd: B, C, D, F, G, I, L, N
2. Sample responses:
  - E, K, and O all show that 12 is even. I see that all the eggs have pairs in E. In K I see two equal groups of 6. O shows the same thing as K just with numbers in an equation.
  - B, G, and N all show that 11 is odd. B shows 11 is odd because if you try to pair the buttons one will be left out. G shows 2 equal groups of 5 and 1 left out. N shows the same thing as G but with an equation. You can see two addends are the same.

### Launch

- Groups of 2
- Give each group a set of cards.

### Activity

- “When it’s your turn, pick a card. Decide whether it shows an even or odd number of objects. Then, explain your choice to your partner. Place each card into the even group or the odd group.”
- “If your partner agrees, continue sorting your cards.”
- “If your partner disagrees, listen to their explanations and make a decision together about how to sort the card.”

### MLR8 Discussion Supports

- Display sentence frames to support small-group discussion:
  - “This card shows an even number because . . .”
  - “This card shows an odd number because . . .”
  - “I agree because . . .”
  - “I disagree because . . .”
- 12 minutes: partner work time
- Monitor for a variety of ways students explain how they know a representation

shows even or odd for sharing in the lesson synthesis.

### Synthesis

- Invite previously identified students to share a match that shows an even number of objects.
- “How do these cards show that the number of objects is even?”
- Invite previously identified students to share a match that shows an odd number of objects.
- “How do these cards show that the number of objects is odd?”

## Lesson Synthesis

🕒 10 min

“Today we practiced identifying whether different representations of groups of objects showed an even or odd number of members.”

“Think of at least two different ways you explained how a representation showed an even or odd number of objects. Then you will share your ideas with your partner.”

Listen for students who:

- Look for or create 2 equal groups.
- Look for pairs or pair objects.
- Count the objects by 2.

Share and record responses.

### Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Supporting)
- How Close? (1–5), Stage 4: Add to 1,000 (Supporting)

---

**Complete Cool-Down**

---

**Response to Student Thinking**

Students identify the number of balloons as odd or the number of circles as even.

**Next Day Support**

- Launch Warm-up or Activity 1 by highlighting key vocabulary from previous lessons.

## Lesson 4: Decompose Even and Odd Numbers

### Standards Alignments

Building On 2.OA.B.2  
Addressing 2.OA.B.2, 2.OA.C.3

### Teacher-facing Learning Goals

- Represent an even number as the sum of two equal addends.

### Student-facing Learning Goals

- Let's represent even and odd numbers.

### Lesson Purpose

The purpose of this lesson is for students to represent even numbers as the sum of two equal addends.

In previous lessons, students determined whether groups of objects and representations had an even or odd number of objects by creating 2 equal groups or pairing objects.

In this lesson, students explore patterns in the ways they can represent even and odd numbers as sums of two addends. In the first activity, they decompose even and odd numbers in different ways and notice that only the even numbers of objects could be decomposed into two equal addends. In the second activity, students practice decomposing numbers into two equal addends and verify that even numbers can be represented as a sum of two equal addends. They will continue to use expressions with equal addends to represent arrays in upcoming lessons and will relate multiplication expressions to addition expressions with equal addends in grade 3.

Throughout the lesson, it is important to emphasize that even numbers can be represented as a sum of two equal addends. Avoid communicating a misconception that odd numbers can not be represented as a sum of two equal addends. Students will learn that odd numbers cannot be represented as a sum of two equal whole numbers as they learn more about whole numbers and fractions in later grades.

This lesson has a Student Section Summary.

### Access for:

#### Students with Disabilities

- Representation (Activity 1)

#### English Learners

- MLR5 (Activity 1)

## Instructional Routines

Number Talk (Warm-up)

### Materials to Gather

- Counters: Activity 1, Activity 2

### Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

### Teacher Reflection Question

Throughout the year, students have practiced adding and subtracting within 20 to develop fluency. How did students leverage their fluency to decompose numbers into 2 equal addends?

## Cool-down (to be completed at the end of the lesson)

🕒 5 min

### Two Equal Addends

#### Standards Alignments

Addressing 2.OA.C.3

#### Student-facing Task Statement

Decide whether the number of dots is even or odd. Circle your choice.

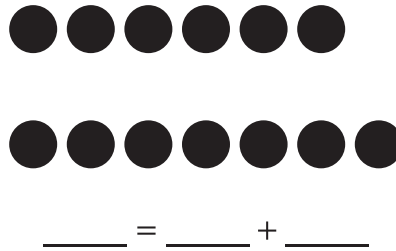
Write an equation with two equal addends for each image if you can.

- even or odd



$$\underline{\quad} = \underline{\quad} + \underline{\quad}$$

2. even or odd



### Student Responses

1. Even.  $10 = 5 + 5$
2. Odd. You can't write an equal addend equation

## ----- Begin Lesson -----

### Warm-up

🕒 10 min

Number Talk: Equal Addends

#### Standards Alignments

Addressing 2.OA.B.2

The purpose of this Number Talk is to elicit strategies and understandings students have for finding sums when both addends are the same and sums when one addend is one less or one more than the other. These understandings help students develop fluency and will be helpful later in this lesson when students will need to be able to decompose numbers into two equal addends or two addends that are as close as possible as they reason about even and odd numbers.

#### Instructional Routines

Number Talk

#### Student-facing Task Statement

Find the value of each expression mentally.

#### Launch

- Display one expression.

- $6 + 6$
- $7 + 7$
- $7 + 8$
- $8 + 9$

### Student Responses

- 12:  $6 + 4 = 10$ ,  $10 + 2 = 12$  or  $6 + 6$  is a fact I know.
- 14:  $7 + 3 = 10$ ,  $10 + 4 = 14$  or  $7 + 7$  is a fact I know.
- 15:  $7 + 7 = 14$ ,  $14 + 1 = 15$
- 17:  $8 + 8 = 16$ ,  $16 + 1 = 17$

- “Give me a signal when you have an answer and can explain how you got it.”
- 1 minute: quiet think time

### Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

### Synthesis

- “How are the expressions the same? How are they different?”

## Activity 1

🕒 20 min

Share in Different Ways

### Standards Alignments

Building On 2.OA.B.2

Addressing 2.OA.C.3

The purpose of this activity is for students to recognize that even numbers can be represented as the sum of two equal addends. The activity is designed to elicit student curiosity about which types of decompositions are possible and which are not. Students may notice many patterns in the ways even and odd numbers can be decomposed which will be useful in future lessons. However, the synthesis should be focused on representing even numbers as sums of equal addends.

### Access for English Learners

*MLR5 Co-Craft Questions.* Keep books or devices closed. Display only the problem stem sentences, without revealing the questions, and ask students to write down possible mathematical questions that could be asked about the situation. Invite students to compare their questions before revealing the task. Ask, “What do these questions have in common? How are they different?” Reveal the intended questions for this task and invite additional connections.

*Advances: Reading, Writing*

### Access for Students with Disabilities

*Representation: Internalize Comprehension.* Provide students with a graphic organizer, such as a sorting mat that has images of gift bags or simply two large circles, to physically share the “cookies” (images of cookies cut out or counters, chips, etc.). Use this to give a concrete example that supports the context of the problems.

*Supports accessibility for: Organization, Visual-Spatial Processing, Conceptual Processing*

## Materials to Gather

Counters

### Student-facing Task Statement

1. Kiran baked 12 cookies. He wants to put them in two gift bags. Show a few different ways he can share the cookies.
  - a. Can both bags have the same amount of cookies?  
 $12 = \underline{\quad\quad} + \underline{\quad\quad}$
  - b. Can both bags have an even number of cookies?  
 $12 = \underline{\quad\quad} + \underline{\quad\quad}$
  - c. Can both bags have an odd number of cookies?  
 $12 = \underline{\quad\quad} + \underline{\quad\quad}$
  - d. Can one bag have an even number of cookies and the other have an odd number of cookies?

### Launch

- Groups of 2
- Give students access to counters.

### Activity

- “Figure out different ways the students could share their cookies.”
- “Show your thinking for each way. Use equations to show the groups.”
- “Some ways may not be possible. Be ready to show and explain why.”
- 5 minutes: independent work time
- “Share your thinking with your partner. How are your equations the same? How are they different?”
- 10 minute: partner discussion

$$12 = \underline{\quad} + \underline{\quad}$$

2. Lin baked 14 cookies. She wants to put them in two gift bags. Show a few different ways she can share the cookies.

- a. Can both bags have the same amount of cookies?

$$14 = \underline{\quad} + \underline{\quad}$$

- b. Can both bags have an even number of cookies?

$$14 = \underline{\quad} + \underline{\quad}$$

- c. Can both bags have an odd number of cookies?

$$14 = \underline{\quad} + \underline{\quad}$$

- d. Can one bag have an even number of cookies and the other have an odd number of cookies?

$$14 = \underline{\quad} + \underline{\quad}$$

3. Noah baked 15 cookies. He wants to put them in two gift bags. Show a few different ways he can share the cookies.

- a. Can both bags have the same amount of cookies?

$$15 = \underline{\quad} + \underline{\quad}$$

- b. Can both bags have an even number of cookies?

$$15 = \underline{\quad} + \underline{\quad}$$

- c. Can both bags have an odd number of cookies?

$$15 = \underline{\quad} + \underline{\quad}$$

- d. Can one bag have an even number of cookies and the other have an odd number of cookies?

$$15 = \underline{\quad} + \underline{\quad}$$

## Synthesis

- “What did you notice about the possible ways the students could share their cookies?” (Kiran and Lin could share their cookies in the most ways. Noah could only share with one bag of even and one bag of odd.)
- Display:
  - $12 = 6 + 6$
  - $14 = 7 + 7$
  - $15 = 7 + 8$
- “How do these equations represent the student’s cookies?”
- “Which students baked an even number of cookies? Use the equations to explain how you know.” (Kiran and Lin because the equations show you can split their cookies into two equal groups.)

**Student Responses**

1.
  - a. Yes.  $12 = 6 + 6$
  - b. Yes.  $12 = 4 + 8$
  - c. Yes.  $12 = 5 + 7$
  - d. No. Every time I make an even group, the other group is even.
2.
  - a. Yes.  $14 = 7 + 7$
  - b. Yes.  $14 = 6 + 8$
  - c. Yes.  $14 = 3 + 11$
  - d. No. Every time I make an even group, the other group is even.
3.
  - a. No. There's no way to make 2 equal groups without one left over.
  - b. No. Every time I make an even group the other group is odd.
  - c. No. Every time I make an odd group the other group is even.
  - d. Yes.  $15 = 7 + 8$

**Activity 2**

🕒 15 min

Represent Numbers with Two Addends

**Standards Alignments**

Building On 2.OA.B.2

Addressing 2.OA.C.3

The purpose of this activity is for students to represent even numbers as a sum of two equal addends. They sort all numbers between 0 and 20 into even and odd and notice that all even numbers can be represented as sums of two equal addends while odd numbers cannot (MP8). Students may also use the sorting activity to understand and explain why 0 is an even number.

## Materials to Gather

Counters

### Student-facing Task Statement

- Pick a number between 0 and 20.
- Decide with your partner whether the number is even or odd.
- Complete the equation to show your number as the sum of two equal addends. If you cannot use two equal addends, use two addends that are as close as possible.

even	odd
_____ = _____ + _____	_____ = _____ + _____
_____ = _____ + _____	_____ = _____ + _____
_____ = _____ + _____	_____ = _____ + _____
_____ = _____ + _____	_____ = _____ + _____
_____ = _____ + _____	_____ = _____ + _____
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_____ = _____ + _____	_____ = _____ + _____
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_____ = _____ + _____	_____ = _____ + _____
_____ = _____ + _____	_____ = _____ + _____
_____ = _____ + _____	_____ = _____ + _____

### Student Responses

even	odd
$0 = 0 + 0$	$1 = 0 + 1$
$2 = 1 + 1$	$3 = 1 + 2$
$4 = 2 + 2$	$5 = 2 + 3$
$6 = 3 + 3$	$7 = 3 + 4$
$8 = 4 + 4$	$9 = 4 + 5$
$10 = 5 + 5$	$11 = 5 + 6$
$12 = 6 + 6$	$13 = 6 + 7$
$14 = 7 + 7$	$15 = 7 + 8$
$16 = 8 + 8$	$17 = 8 + 9$
$18 = 9 + 9$	$19 = 9 + 10$
$20 = 10 + 10$	

### Launch

- Groups of 2
- Give students access to counters.

### Activity

- “Let’s try to decompose more numbers into two equal addends.”
- “Take turns picking a number between 0 and 20. Decide together whether the number is even or odd and record it in the table.”
- “Then try to decompose the number into two equal addends. If you can, record it on the table.”
- “If you cannot find a way to decompose the number into two equal addends, find two addends that are as close together as possible that make your number.”
- Demonstrate with Kiran (12) and Noah’s (15) cookies as needed.
- “Keep going until you have sorted all the numbers from 0 to 20.”
- 10 minutes: partner work time

### Synthesis

- Display the completed table.
- “What do you notice about even and odd numbers?” (All the even numbers have the same addends. All the even numbers are “doubles.” The odd numbers have one addend that is one more than the other.)
- “Explain why even numbers can be decomposed into two equal addends.”

## Advancing Student Thinking

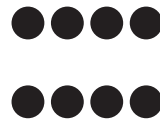
If students place an odd number in the even group or an even number in the odd group, consider asking:

- “How could you use counters or a drawing to show if this number is odd or even?”

## Lesson Synthesis

🕒 10 min

Draw or display:



“Is there an even or odd number of dots? Explain.” (Even. I see two equal groups of 4. I see 4 pairs and no dots left over.)

“What is an equation that would show that the number of dots is even?” ( $4 + 4 = 8$ ,  $8 = 4 + 4$ )

## Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Supporting)
- How Close? (1–5), Stage 4: Add to 1,000 (Supporting)

## Student Section Summary

In this section, we learned that groups of objects have either an even or odd number of members. We learned that an even number of objects can be split into 2 equal groups or into groups of 2 with no objects left over. We learned that an odd number of objects always has one object left over when you make 2 equal groups or groups of 2. We also learned that even numbers can be represented as an equation with 2 equal addends.



Odd

$$3 + 3 + 1 = 7$$



Even

$$4 + 4 = 8$$

---

### Complete Cool-Down

---

#### Response to Student Thinking

Students recognize the image of 13 dots as odd, but attempt to write an equation with equal addends. For example,  $13 = 6 + 6$ .

#### Next Day Support

- Launch warm-up or Activity 1 by highlighting important ideas from previous lessons.

# Lesson 5: Patterns with Even and Odd Numbers

## (Optional)

### Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.3

### Teacher-facing Learning Goals

- Recognize patterns in sums of odd and even numbers.

### Student-facing Learning Goals

- Let's look for patterns with even and odd numbers.

### Lesson Purpose

The purpose of this optional lesson is for students to notice and describe patterns in sums within 20 using what they know about even and odd numbers.

In previous lessons, students worked with physical objects and images to determine if groups of objects were even or odd. They represented even numbers as an equation with two equal addends.

In this lesson, students continue to practice identifying and justifying even and odd numbers and deepen their number sense with numbers within 20. They notice patterns in even and odd numbers when counting and use what they know about 2 equal groups and pairs to generalize why adding 1 changes whether a group is even or odd, but adding 2 does not (MP8). Students add even and odd numbers and connect the mental strategies they use to add within 20 to patterns in the value of the sums of even and odd addends.

This lesson is optional because it goes beyond the depth of understanding required to address the standards.

### Access for:

#### Students with Disabilities

- Representation (Activity 2)

#### English Learners

- MLR2 (Activity 2)

### Instructional Routines

How Many Do You See? (Warm-up)

**Materials to Gather**

- Counters: Activity 2

**Materials to Copy**

- Presto Chango Recording Sheet (groups of 1): Activity 2

**Lesson Timeline**

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

**Teacher Reflection Question**

How did students use what they have learned about even and odd numbers to explain the effect of adding 1 or 2? How did students show what they understand about numbers that can be decomposed into 2 equal groups or can be made into pairs? How can you build on that understanding as students consider other equal groups in the next section?

**Cool-down** (to be completed at the end of the lesson)

⌚ 5 min

## Odd One Out

**Standards Alignments**

Addressing 2.OA.B.2, 2.OA.C.3

**Student-facing Task Statement**

- Elena has 8 counters. Does she have an even or odd number of counters? Explain or show your reasoning.
- Without adding, explain which one of these expressions represents an odd number.

A

$4 + 4$

B

$8 + 1$

C

$8 + 2$

**Student Responses**

- Even. Sample response: Even because you can count to 8 by skip-counting by 2. 2, 4, 6, 8.
- $8 + 1$ . Sample response:  $8 + 1$  is odd because 8 is even. If you add one more it would not have a pair.

---

**Begin Lesson**


---

**Warm-up**

🕒 10 min

How Many Do You See: Even or Odd

**Standards Alignments**

Addressing 2.OA.C.3

The purpose of this How Many Do You See is for students to use grouping strategies to describe the images they see. In the synthesis, students describe how they saw the dots and whether the groups of dots have an even or odd number of members. When recording responses, include equations with equal addends to help students make the connection to even numbers being written as the sum of two equal addends and odd numbers being written as 2 equal addends +1.

**Instructional Routines**

How Many Do You See?

**Student-facing Task Statement**

How many do you see? How do you see them?

**Launch**

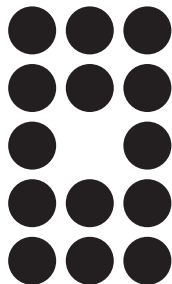
- Groups of 2
- “How many do you see? How do you see them?”
- Flash image.
- 30 seconds: quiet think time

**Activity**

- Display image.
- 1 minute: partner discussion
- Record responses with equations.
- Repeat for each image.

**Synthesis**

- “Which images show even groups of dots?” (image 1 and image 3)
- “How can you tell using the equations we recorded?”



## Student Responses

Sample responses:

- 12: I see 2 groups of 6.
- 13: I see 2 groups of 6 and one in the middle.
- 14: I see 2 groups of 6 and two in the middle.

## Activity 1

🕒 15 min

Even and Odd Round-about

### Standards Alignments

Addressing 2.OA.C.3

The purpose of this activity is for students to describe patterns in the sequence of even and odd numbers when they count by 1. Students notice that even numbers are numbers that you count when you skip-count by 2 (MP7).

In order for all students to visualize the sequence, perform the activity where the whole class can be arranged in a circle with space for students to sit and stand. Depending on class size, the count may go beyond 20. It is ok for students to notice and wonder about even and odd numbers beyond 20, but maintain the focus throughout the lesson on numbers within 20.

### Student-facing Task Statement

What did you notice? What do you wonder?

### Launch

- Form the class into a circle with all students standing.
- “We are going to count together by 1. The first person to count will say 0 and stay

## Student Responses

Students may notice:

- When we counted by 1, the numbers went back and forth from even to odd.
- All the people standing said even numbers.
- All the people sitting said odd numbers.

Students may wonder:

- Are all the numbers even if you keep skip-counting by 2?
- Are all the numbers odd when you start with an odd number and count on by 2?
- What happens when you count on by different numbers?

standing.”

- “The next person will say their number and sit down. The next person will say their number and stay standing.”
- “We will keep counting until everyone has said a number.”
- As needed, demonstrate the stand-sit-stand-sit sequence.
- Record the count:

	0	2	4	6	8	10	12	14	16	18	20
	1	3	5	7	9	11	13	15	17	19	

- Prompt students who are standing to say their numbers. (0, 2, 4, ...)
- Prompt students who are sitting to say their numbers. (1, 3, 5, ...)

## Activity

- “Write down what you notice and what you wonder about the numbers in our count.”
- 3 minutes: independent work time
- 2 minutes: partner discussion
- Monitor for students' responses that focus on even and odd number patterns to share in synthesis.

## Synthesis

- Share and record student responses.
- Display:

even	0	2	4	6	8	10	12	14	16	18	20
odd	1	3	5	7	9	11	13	15	17	19	

- “This is a list of all the even and odd numbers from 0 to 20.”
- “What patterns do you notice?” (All the even numbers are numbers you say when you skip-count by 2. The digits 0, 2, 4, 6, 8 repeat in the ones place for even numbers.

The digits 1, 3, 5, 7, 9 repeat in the ones place in odd numbers.)

- “How could you use these patterns to tell if a number of objects is even or odd?” (If the number is an even number you say it when you skip-count by 2.)

## Activity 2

🕒 20 min

### Presto Chango

#### Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.3

The purpose of this activity is for students to make and test conjectures about the effect of adding 1 and adding 2 on the parity of a group of objects. They use what they know about equal groups, pairs, and skip-counting to explain why adding 1 may change whether a group of objects is even or odd and why adding 2 will have no effect (MP3, MP8).

#### 🌐 Access for English Learners

*MLR2 Collect and Display.* Collect the language students use as they complete the table. Display words and phrases such as: “even,” “odd,” “pair,” “one more,” “two more,” “pattern,” “equal group,” “left over,” and “skip-count.” During the synthesis, invite students to suggest ways to update the display: “What are some other words or phrases we should include?” Invite students to borrow language from the display as needed.

*Advances: Conversing, Reading*

#### ♿ Access for Students with Disabilities

*Representation: Develop Language and Symbols,* Represent the problem in multiple ways to support understanding of the situation. For example, place the counters on a 10-frame (up and down to show groups of 2 distinctly) and allow students to explain whether the number is even or odd and why.

*Supports accessibility for: Organization, Conceptual Processing*

## Materials to Gather

Counters

## Student-facing Task Statement

1. In the first column of your recording sheet, decide whether each student has an even or odd number of counters. Show your reasoning and circle your choice.
2. Complete the gray column. Does adding 1 change whether the number of counters is even or odd? Explain.
3. Complete the last column. Does adding 2 change whether the number of counters is even or odd? Explain.

## Student Responses

1. Sample response:


2. Sample response: Adding 1 does change if a number is even or odd. When you add 1, if the number was even, now there's 1 that doesn't have a pair. If the number was odd, now you can make a new pair.
3. Sample response: Adding 2 does not change if a number is even or odd. When you add 2, you are adding a pair. If the number was already even, it will stay even. If it was odd, the one without a partner still won't have a partner.

## Materials to Copy

Presto Chango Recording Sheet (groups of 1)

## Launch

- Groups of 2
- Give students recording sheets and access to counters.
- Draw:



- "If we add 1 more circle to this group, will it change if the group has an even or odd number?" (Yes. It's odd, so if you add 1 circle you'd make another pair and it'd be even.)
- 30 seconds: quiet think time
- Share responses.
- "Does adding 1 always change whether a number of objects is even or odd?" (Yes. If you add 1 to an odd number, you'd always make a new pair, and the sum would be even. If it's even, and you add 1, you'd have a leftover, so the sum would be odd. No. I think it works with some numbers, but maybe not all numbers.)
- 30 seconds: quiet think time
- 1 minute: partner discussion
- Share and record responses.

## Activity

- "Let's test our ideas. Complete the first two columns of the table. You can test other numbers if you have time."
- 4 minutes: independent work time
- 2 minutes: partner discussion
- "If we add 2 more to a group, will it change

if the group has an even or odd number?" (No. For even, it'd be like counting by 2, the next number is even too. When we counted on 2 to odd, we made a list of odd numbers. Yes. I think if you add to a number, it's going to change some numbers.)

- 30 seconds: quiet think time
- 1 minute: partner discussion
- Share and record responses.
- "Let's test our thinking. Complete the table for the "add 2 counters" column. You can test other numbers if you have time."
- 4 minutes: independent work time
- 2 minutes: partner discussion

### Synthesis

- Display student conjectures from launch.
- "Let's use Jada's counters to show which of our ideas are true."
- Invite students to share how they filled in the row about Jada's counters.
- Display:
  - $16 = 8 + 8$
  - $17 = 8 + 8 + 1$
  - $18 = 8 + 8 + 2$
- "How do these equations show that adding 1 changes whether a number is even or odd, but adding 2 does not?" (You can see 2 equal groups of 8 in each. 17 is odd because there is one left out. 18 is even because you have 2 equal groups and 1 pair. You could give each group 1 to make it  $18 = 9 + 9$ .)

## Lesson Synthesis

🕒 10 min

Display:

“Han has an odd number of objects.”

“Lin has 2 more than Han.”

“Does Lin have an odd or even number of objects? Explain.” (Lin has an odd number of objects. Since Han has an odd number, Lin has one pair more. There would be no extra objects to make a new pair. It’s like counting on by 2 with an odd number, the next number will be odd.)

---

## Suggested Centers

- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)
- Five in a Row: Addition and Subtraction (1–2), Stage 8: Add within 1,000 with Composing (Supporting)
- How Close? (1–5), Stage 4: Add to 1,000 (Supporting)

---

## Complete Cool-Down

### Response to Student Thinking

Students focus their explanation for why  $8 + 1$  is odd by drawing 9 objects to show that 9 is odd.

### Next Day Support

- Launch warm-up or Activity 1 by highlighting important ideas from previous lessons.

## Lesson 6: Center Day 1 (Optional)

### Standards Alignments

Addressing 2.NBT.A.2, 2.NBT.B.7, 2.NBT.B.8, 2.OA.B.2  
 Building Towards 2.OA.C.4

### Teacher-facing Learning Goals

- Add and subtract within 1,000 using strategies based on place value and the properties of operations.
- Skip-count by 2, 5, and 10.

### Student-facing Learning Goals

- Let's skip-count and practice addition and subtraction.

### Lesson Purpose

The purpose of this lesson is for students to skip-count by 2, 5, and 10 and to add and subtract within 1,000.

This lesson is optional because it is an opportunity for extra practice that not all classes may need. In Activity 1, students learn stage 4 of the Write Numbers center, which was first introduced in grade 1. In this new stage, called Skip Count by 2, 5, and 10, students write numbers as they skip-count by 2, 5, or 10. In Activity 2, students choose to continue working on Write Numbers, or choose between three previously introduced centers focused on addition and subtraction within 1,000.

### Instructional Routines

Number Talk (Warm-up)

#### Materials to Gather

- Dry erase markers: Activity 1
- Materials from previous centers: Activity 2
- Sheet protectors: Activity 1

#### Materials to Copy

- Write the Number Stage 4 Gameboard (groups of 2): Activity 1

### Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	20 min

### Teacher Reflection Question

How did you use questioning to assess what students understand about mathematics during their work in centers?

Lesson Synthesis

10 min

----- **Begin Lesson** -----**Warm-up**

🕒 10 min

Number Talk: Two More

**Standards Alignments**

Addressing 2.OA.B.2

Building Towards 2.OA.C.4

The purpose of this Number Talk is to elicit strategies and understandings students have for counting by 2. These understandings help students develop fluency and will be helpful later in the unit when students will need to be able to use skip-counting to find the total number of objects in arrays and to represent arrays with equations.

**Instructional Routines**

Number Talk

**Student-facing Task Statement**

Find the value of each expression mentally.

- $2 + 2 + 2$
- $2 + 2 + 2 + 2$
- $2 + 2 + 2 + 2 + 2$
- $2 + 2 + 2 + 2 + 2 + 2$

**Student Responses**

- 6:  $2 + 2 = 4$ ,  $4 + 2 = 6$
- 8: I counted by 2. 2, 4, 6, 8
- 10: I counted by 2. 2, 4, 6, 8, 10

**Launch**

- Display one expression.
- "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: quiet think time

**Activity**

- Record answers and strategies.
- Keep expressions and work displayed.
- Repeat with each expression.

- 12: I saw that it's two more than the last expression.  $10 + 2 = 12$

### Synthesis

- "Which expressions could represent an even number of objects? Explain." (They all could. Each 2 is like a pair. You can find each sum by counting by 2.)

## Activity 1

🕒 20 min

Introduce Write Numbers, Skip Count by 2, 5, and 10

### Standards Alignments

Addressing 2.NBT.A.2

The purpose of this activity is for students to learn stage 4 of the Write Numbers center. Students choose to start with 2, 5, or 10. They skip count by that number.

### Materials to Gather

Dry erase markers, Sheet protectors

### Materials to Copy

Write the Number Stage 4 Gameboard  
(groups of 2)

### Launch

- Groups of 2
- Give each group a recording sheet.
- "We are going to learn a new way to play the Write Numbers center."
- "Partner A will choose whether to start with 2, 5, or 10. You will skip count by that number. Write the next 1, 2, or 3 numbers on the gameboard."
- "Take turns choosing how many numbers to write and then writing them. The player who writes the last number on the gameboard wins."
- "Then you can play again and have the other partner choose the number you count by."

- "Let's play a round together."
- Play a round with the class.
- "Now you'll play Write Numbers with your partner."

### Activity

- 15 minutes: partner work time
- Monitor for how students decide how many numbers to write on their turn.

### Synthesis

- "How did you decide how many numbers to write on your turn?"

---

## Activity 2

🕒 20 min

Centers: Choice Time

### Standards Alignments

Addressing 2.NBT.A.2, 2.NBT.B.7, 2.NBT.B.8

The purpose of this activity is for students to choose from activities that focus on skip-counting and addition and subtraction within 1,000.

Students choose from any stage of previously introduced centers.

- Write Numbers
- Target Numbers
- Five in a Row
- How Close

### Materials to Gather

Materials from previous centers

## Required Preparation

Gather materials from:

- Write Numbers, Stage 4
- Target Numbers, Stages 6 and 7
- Five in a Row, Stages 7 and 8
- How Close, Stage 4

## Student-facing Task Statement

Choose a center.

Write Numbers



Target Numbers



Five in a Row



How Close



## Launch

- “Now you will choose from centers we have already learned. One of the choices is to continue with Write Numbers.”
- Display the center choices in the student book.
- “Think about what you would like to do first.”
- 30 seconds: quiet think time

## Activity

- Invite students to work at the center of their choice.
- 8 minutes: center work time
- “Choose what you would like to do next.”
- 8 minutes: center work time

## Synthesis

- “What did you like about the activities you worked on today?”

## Lesson Synthesis

🕒 10 min

“Today we learned a new way to play Write Numbers. We skip-counted by 2, 5, and 10. Which number did you most like to skip-count by during this center? Why?”

## Section B: Rectangular Arrays

### Lesson 7: What is an Array?

#### Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.3, 2.OA.C.4

#### Teacher-facing Learning Goals

- Describe an array as an arrangement of objects into rows with an equal number of objects in each row.

#### Student-facing Learning Goals

- Let's learn about arrays.

#### Lesson Purpose

The purpose of this lesson is for students to learn that an **array** is an arrangement of objects into rows with an equal number of objects in each row.

In the first section of this unit, students determined whether a group of objects was odd or even by organizing them in pairs or putting them into 2 equal groups.

In this lesson, students describe the structure of an array. They describe the number of objects in each row of an array and learn that the total number of objects in an array can be determined by finding the sum of the number of objects in each row. Although students may describe many features of the arrays in the lesson, the focus is on describing the rows of the array. They attend to the number of rows, the number in each row, and the total number of objects. In the next lesson, students will be encouraged to describe the columns of an array and will use this term in future lessons.

#### Access for:

#### Students with Disabilities

- Engagement (Activity 2)

#### Instructional Routines

MLR8 Discussion Supports (Activity 2), Which One Doesn't Belong? (Warm-up)

## Materials to Gather

- Counters: Activity 1, Activity 2

## Lesson Timeline

Warm-up	10 min
Activity 1	20 min
Activity 2	15 min
Lesson Synthesis	10 min
Cool-down	5 min

## Teacher Reflection Question

In previous lessons, students explained why an a number of objects was even or odd using diagrams and by skip-counting by 2. In this lesson, how did students use the structure of arrays to make sense of skip counting and finding total amounts without counting by 1?

## Cool-down (to be completed at the end of the lesson)

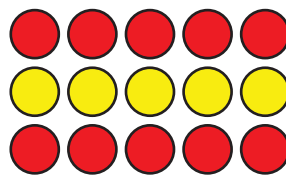
🕒 5 min

### Count the Counters

### Standards Alignments

Addressing 2.OA.C.4

### Student-facing Task Statement



- How many rows are in this array?
- How many counters are in each row?
- How many counters are there in all?

### Student Responses

- There are 3 rows.
- There are 5 counters in each row.
- There are 15 counters in all.

---

 Begin Lesson
 

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## Warm-up

🕒 10 min

### Which One Doesn't Belong: Counter Collections

#### Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.3

This warm-up prompts students to carefully analyze and compare different arrangements of circles, including an array. Listen for the ways student describe how they see equal groups in each arrangement and use the language they developed in previous lessons to determine if a group of objects was even or odd.

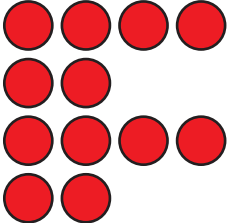
#### Instructional Routines

Which One Doesn't Belong?

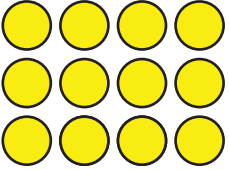
#### Student-facing Task Statement

Which one doesn't belong?

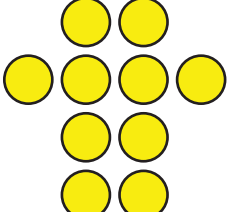
**A**



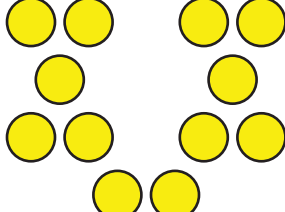
**B**



**C**



**D**



#### Student Responses

- A is the only one that doesn't show yellow

#### Launch

- Groups of 2
- Display the image.
- "Pick one that doesn't belong. Be ready to share why it doesn't belong."
- 1 minute: quiet think time

#### Activity

- "Discuss your thinking with your partner."
- 2–3 minutes: partner discussion
- Record responses.

#### Synthesis

- "How are the circles in B arranged differently than in the other groups?" (They are all lined up. They are arranged in rows. There are the same number of circles in each row. There are the same number of circles in columns, too.)
- "We call objects arranged in equal rows an

circles.

- B is the only one that doesn't have different numbers of circles in each row or group. It has the same number of circles in each row and in each column.
- C is the only one that doesn't have 12 circles.
- D is the only one that doesn't show the circles in one group.

**array.** The rows go from side to side. We are going to explore arrays today."

## Activity 1

🕒 20 min

What is an Array?

### Standards Alignments

Addressing 2.OA.C.4

The purpose of this activity is for students to create arrays with counters. Students get sets of 6, 7, and 9 counters. Based on their experiences with images that show an even number of objects arranged in 2 equal groups, they may make an array with 3 rows and 2 columns or 2 rows and 3 columns with 6 counters. They may wonder if 7 or 9 counters can be arranged in an array since they are not even numbers. Encourage students to experiment with other ways of arranging the counters that include more than 2 rows or columns. They may also make an array with 1 row. Arrays with 1 row or 1 column will be studied in future grades, so for the rest of this unit, students should be encouraged to make arrays with more than 1 row and more than 1 column.

### Materials to Gather

Counters

### Required Preparation

- Create containers with 6, 7, and 9 counters for each group of 2.

### Student-facing Task Statement

Arrange each set of counters into equal rows with no extra counters.

1. How many counters are there in all? \_\_\_\_\_

### Launch

- Groups of 2
- Give each group 3 sets of counters with 6, 7, and 9.

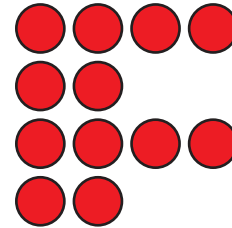
Show how you arranged them using words, drawings, or numbers.

2. How many counters are there in all? \_\_\_\_  
Show how you arranged them using words, drawings, or numbers.
3. How many counters are there in all? \_\_\_\_  
Show how you arranged them using words, drawings, or numbers.

## Student Responses

1. Sample response:
  - 6 counters
  - I put pairs going down. I lined them up in twos.
  - Students arrange or draw counters in 3 rows of 2 counters.
2. Sample response:
  - 7 counters
  - I made 1 row.
  - Students arrange or draw counters in 1 row of 7 counters.
3. Sample response:
  - 9 counters
  - I started with a row of 3 counters, then I kept adding 3 more.
  - Students arrange or draw counters in 3 rows of 3 counters.

- Display A from the warm-up or arrange counters to show:



- “The red counters are arranged in rows, but it is not an array. How could we rearrange the counters to make an array like image B?” (We could move the bottom two counters to the middle row. We could move one from the top row to the next row. We could move 1 from the third row to the bottom row.)
- 1 minute: quiet think time
- 1 minute: partner discussion
- Share responses.

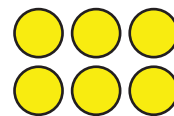
## Activity

- “Arrange each of your sets of counters into an array. Your arrays should have the same number of counters in each row with no extra counters. Be prepared to explain how you made an array out of each set.”
- “If you have time, try to figure out a different way to make an array out of each set of counters.”
- 12 minutes: partner work time

## Synthesis

- “7 and 9 are both odd numbers. What did you notice about the arrays you could make with them?” (I couldn't make an array with 2 rows. With 9 counters, I could do 3 rows with 3 counters in each row. For 7, the only way we did it was with 1 row with all 7 counters.)
- Display student work for array of 6 or

arrange counters to show:



- “How can we describe this array of 6 counters?” (There are 3 on the top and 3 on the bottom.)
- “Another way to describe this array is to say there are 2 rows with 3 counters in each.”

### Advancing Student Thinking

If students create arrangements with unequal rows or only try to make arrays that have 2 rows or 2 columns (2 equal groups), consider asking:

- “What did you try so far? How many counters were in each row?”
- “\_\_\_ counters in each row did not make an array without any leftovers. What other amount of counters in each row could you try?”

## Activity 2

🕒 15 min

### Rows of Counters

#### Standards Alignments

Addressing 2.OA.C.4

The purpose of this activity is for students to describe the number of rows in an array, the number of objects in each row, and the total number of objects. They use this vocabulary to describe arrays and create arrays given a number of counters and a number of a rows (MP6). They may use trial and error to build these arrays.

This activity uses *MLR8 Discussion Supports*. *Advances: speaking, conversing*

## Access for Students with Disabilities

*Engagement: Provide Access by Recruiting Interest.* Optimize meaning and value. Invite students to share ideas to create a context that relates to their own lives. For example, ask students where they have seen “arrays” in their world—eggs in a carton, cupcakes in a box, fruit organized at the grocery store, chocolates in a box, and so on.

*Supports accessibility for: Conceptual Processing, Organization, Attention*

## Instructional Routines

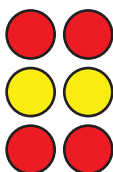
MLR8 Discussion Supports

## Materials to Gather

Counters

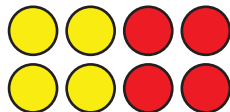
### Student-facing Task Statement

1.



- How many rows are in this array?
- How many counters are in each row?
- How many counters are there in all?

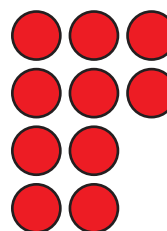
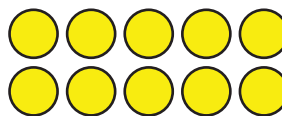
2.



- How many rows are in this array?
  - How many counters are in each row?
  - How many counters are there in all?
- Use 6 counters to make 2 rows with the same number in each row. How many counters are in each row?
  - Use 20 counters to make 4 rows with the

### Launch

- Groups of 2
- Give students access to counters.
- Arrange counters to show:



- “Which of these images shows 10 counters in an array? How do you know?” (The yellow counters are in an array because the rows have the same number of counters in each.)
- 30 seconds: quiet think time
- Share responses.
- “How many rows are in the array?” (2 rows)
- 30 seconds: quiet think time

same number in each row. How many counters are in each row?

### Student Responses

1.
  - a. 3 rows
  - b. 2 counters in each row
  - c. 6 counters
2.
  - a. 2 rows
  - b. 4 counters in each row
  - c. 8 counters
3. 3 counters in each row
4. 5 counters in each row

- Share responses. Circle the 2 rows in the array.
- “How many counters are in each row?” (5 counters)
- 30 seconds: quiet think time
- Share responses.

### Activity

- “Now you will look at a few arrays to decide how many rows each one has, how many there are in each row, and the total number of counters. Then you will make arrays using counters.”

### MLR8 Discussion Supports

- Display sentence frames to support students when they describe the structure of the array:
  - “There are \_\_\_\_ rows in the array.”
  - “There are \_\_\_\_ counters in each row.”
  - “There are \_\_\_\_ counters in all.”
- 8 minutes: partner work time
- Monitor for students who build an array with 5 in each row for 20 counters.

### Synthesis

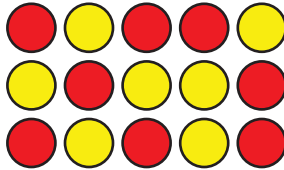
- Display student work for the array with 20 counters.
- “Describe \_\_\_\_’s array.” (It has 20 counters, it has 4 rows and 5 counters in each row.)
- “How can we prove there are 20 counters in this array?” (We can count them. We can skip count by 5. We can add  $5 + 5 + 5 + 5$ . The top 2 rows have 10 and the bottom 2 rows have 10.)

## Lesson Synthesis

🕒 10 min

"Today you learned that an array is an arrangement of objects in rows with an equal number of objects in each row."

Arrange counters to show:



"How could you use the rows to find the total number of counters?" (I know there are 3 rows with 5 in each row. I skip counted by 5. 5, 10, 15)

Share and record responses.

Record  $5 + 5 + 5 = 15$

---

## Suggested Centers

- Write Numbers (1–2), Stage 4: Skip Count by 2, 5, and 10 (Addressing)
- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)

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## Complete Cool-Down

### Response to Student Thinking

Students identify the number of columns and total of each column rather than rows.

### Next Day Support

- Create a poster with important terms or vocabulary from this cool-down.

## Lesson 8: Count Columns and Objects in Columns

### Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.3, 2.OA.C.4

### Teacher-facing Learning Goals

- Describe an array as an arrangement of objects into columns with an equal number of objects in each column.

### Student-facing Learning Goals

- Let's learn about columns in arrays.

### Lesson Purpose

The purpose of this lesson is for students to see that in an array of objects, the objects are arranged into columns with an equal number of objects in each column.

In the previous lesson, students learned that an array is an arrangement of objects into rows with an equal number of objects in each row.

In this lesson, students refine their understanding of an array to include the fact that the objects in a row are equally spaced from each other. When arranged this way, the objects also line up into columns. Students use mathematical language to describe arrays and recognize that rows go side to side and columns go up and down (MP6). They use the structure of the array to find the total number of objects in an array (MP7).

Students should have access to counters throughout the lesson, including during the cool-down.

### Access for:

#### Students with Disabilities

- Representation (Activity 1)

### Instructional Routines

Estimation Exploration (Warm-up), MLR8 Discussion Supports (Activity 1)

### Materials to Gather

- Counters: Activity 1, Activity 2

**Lesson Timeline**

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

**Teacher Reflection Question**

Outside of class, how can you reinforce the array work done today? Are there opportunities at other times during the day to ask students to represent or count objects using an array?

**Cool-down** (to be completed at the end of the lesson)

🕒 5 min

Make Rows and Columns

**Standards Alignments**

Addressing 2.OA.C.4

**Student-facing Task Statement**

1. Show an array with 4 rows and 2 objects in each row.
2. How many columns are there? How many objects are in each column?
3. How many objects are there in all?

**Student Responses**

1. Students show an array with 2 columns and 4 rows.
2. 2 columns with 4 in each
3. 8 objects in all

----- **Begin Lesson** -----**Warm-up**

🕒 10 min

Estimation Exploration: Rearrange the Dots

## Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.3

The purpose of this warm-up is to allow students to think about how organizing objects can help them find the total number more quickly. Each image shows 20 counters. Image 1 makes it difficult to count quickly due to a lack of organization, Image 2 makes it more clear and allows for the conversation about even and odd, and Image 3 connects a familiar structure (10-frame) to the new structure being introduced (an array).

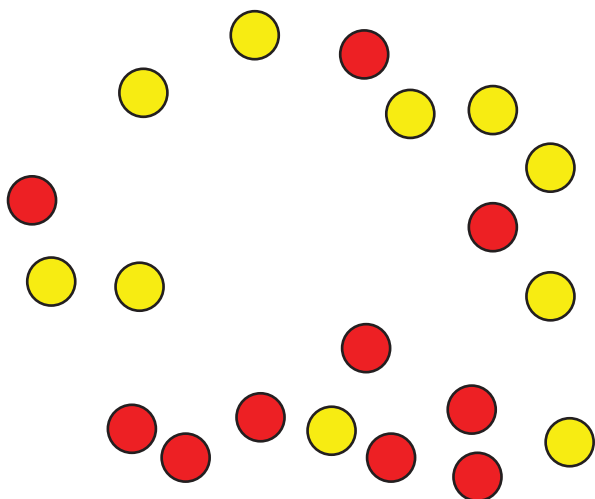
The purpose of an Estimation Exploration is to practice the skill of estimating a reasonable answer based on experience and known information. It gives students a low-stakes opportunity to share a mathematical claim and the thinking behind it (MP3). Asking oneself “Does this make sense?” is a component of making sense of problems (MP1). Making an estimate or a range of reasonable answers with incomplete information is a part of modeling with mathematics (MP4).

## Instructional Routines

Estimation Exploration

### Student-facing Task Statement

How many counters do you see?



Record an estimate that is:

too low	about right	too high

### Launch

- Groups of 2
- Display the image or arrange 20 counters (10 red and 10 yellow) in a random arrangement:
- “How many counters do you see?”
- “What is an estimate that’s too high?” “Too low?” “About right?”
- 1 minute: quiet think time

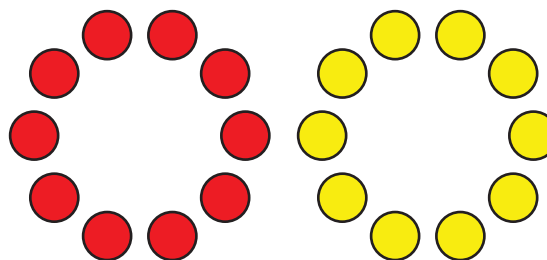
### Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Record responses.
- Arrange counters to show 2 circular arrangements of 10 red and 10 yellow counters:

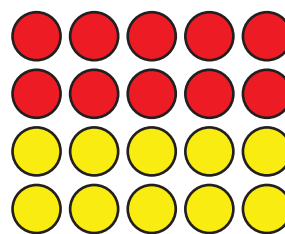
## Student Responses

Sample responses:

- Too low: 5–12
- About right: 13–30
- Too high: more than 30



- “Here are the same counters in a different arrangement. Would you like to revise your thinking?” (I counted the red and there were 10. I think there’s the same amount of yellow, so I said 20.)
- 1 minute: quiet think time
- Share responses.
- After Image 2 ask, “How does this image help you think about whether or not the total is even or odd?” (It helps me see the number of counters as 2 equal groups. So it must be an even number.)
- Arrange the counters into an array of 2 rows of 5 red counters and 2 rows of 5 yellow counters with some space to separate the two colors:



- “This image shows the same number of counters, but in a different arrangement. Would you like to revise your thinking?” (It’s easy now to see that it’s 20. There’s 10 red and 10 yellow.)
- 30 seconds: quiet think time
- Share responses.

## Synthesis

- “We saw different arrangements of the same number of counters. Which one makes it easier to tell how many there are altogether?”

Explain.” (In the last way, it is easy to see it is 10 and another 10. It looks like 2 10-frames.)

- Refer to the counters in an array.
- “Organizing the circles into arrays can help us see ways to find the total more quickly. How could I use skip counting to find the total number of counters?” (We could count by 5 or 2.)

## Activity 1

🕒 15 min

### Count by Columns

#### Standards Alignments

Addressing 2.OA.C.4

The purpose of this activity is for students to describe the structure of an array by identifying the number of columns, the number of objects in each column, and the total number of objects. They learn that the columns of an array go up and down. Students begin to reason about how they can use the structure of the array to find the total number of objects without counting by 1.

This activity uses *MLR8 Discussion Supports*. *Advances: speaking, conversing*

#### 🕒 Access for Students with Disabilities

*Representation: Develop Language and Symbols.* Support understanding of the rows and columns by inviting students to act it out. For example, use students to create the first array (3 rows of 2).

Discuss the students who create the rows. Now switch to talking about columns (2 columns of 3).

Discuss the difference in which students create the columns.

*Supports accessibility for: Visual-Spatial Processing, Organization*

#### Instructional Routines

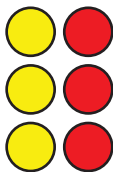
MLR8 Discussion Supports

#### Materials to Gather

Counters

## Student-facing Task Statement

1.



- How many columns are in this array?
- How many counters are in each column?
- How many counters are there in all?

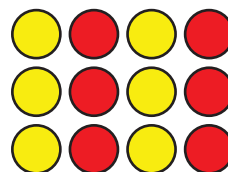
2.



- How many columns are in this array?
  - How many counters are in each column?
  - How many counters are there in all?
- Use 10 counters to make 2 columns with the same number in each column.
    - How many counters are in each column?
    - How many rows are in the array?
    - How could you count these counters without counting by ones?
  - Use 15 counters to make 3 columns with the same number in each column.
    - How many counters are in each column?
    - How many rows are in the array?
    - How many counters are in each row?
    - How could you count these counters without counting by ones?

## Launch

- Groups of 2
- Give students counters.
- "Use your counters to make an array with 3 rows with 4 in each row. Make sure the counters in each row line up with the counters in the other rows."
- Display counters in an array as shown:



- "Arrays are made up of rows, but they also have columns that go up and down. How many columns are in this array?" (4)
- 30 seconds: quiet think time
- Share responses.
- "How many counters are in each column of the array you made?" (3)
- 30 seconds: quiet think time
- Share responses.

## Activity

- "Now you will look at a few arrays to decide how many columns they have, how many in each column, and find the total number of counters. Then you will make arrays using counters and answer a few questions."

## MLR8 Discussion Supports

- Display sentence frames to support students when they describe the structure of the array:
  - "There are \_\_\_\_ columns in the array."
  - "There are \_\_\_\_ counters in each column."

## Student Responses

1.
  - a. 2 columns
  - b. 3 counters in each column
  - c. 6 counters
2.
  - a. 4 columns
  - b. 2 counters in each column
  - c. 8 counters
3.
  - a. 5 in each column
  - b. 5 rows
  - c. Sample response: I could count by 5 or 2.
4.
  - a. 5 in each column
  - b. 5 rows
  - c. 3 counters in each row
  - d. Sample response: I could count by 5. I also see 10 and 5 more.

- "There are \_\_\_\_ counters in all."
- 8 minutes: partner work time

## Synthesis

- Display student work for an array with 10 counters.
- "Describe \_\_\_\_'s array." (It has 10 counters, it has 2 columns and 5 counters in each column. It has 5 rows with 2 counters in each row.)
- "How can we prove there are 10 counters in this array?" (We can skip count by 2. We can add  $2 + 2 + 2 + 2 + 2$ . We can add  $5 + 5$ .)

## Activity 2

🕒 20 min

### Guess My Array

#### Standards Alignments

Addressing 2.OA.C.4

The purpose of this activity is for students to distinguish between rows and columns of arrays based on given clues. The activity synthesis invites students to use the vocabulary they have learned in this lesson and the previous lesson to describe and create arrays (MP6). When making arrays based on clues, it might be helpful to have partners sit back to back.

## Materials to Gather

Counters

## Required Preparation

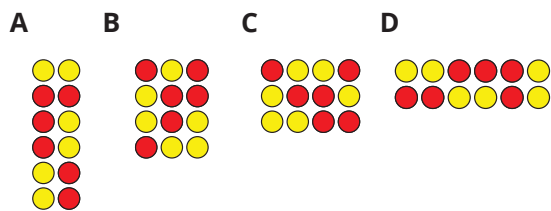
- Each student needs 25 counters.

## Student-facing Task Statement

Four students talked about their arrays.

- Han said, "My array has an even number of counters. It has 2 rows with 6 counters in each row."
- Priya said, "My array has more than 10 counters. It has 4 rows with 3 counters in each row."
- Elena said, "My array is very tall. It has 6 counters in each column."
- Kiran said, "My array has more columns than rows. It has 3 rows."

1. Which array belongs to which student? Write the name of each student below their array.



2. Each student used \_\_\_\_ counters to make an array.
3. Make an array using up to 25 counters, but don't let your partner see.

Give your partner clues about your array, so they can try to make it. Compare to see if your partner made the same array.

Be prepared to explain how you knew the total number of counters.

## Launch

- Groups of 2
- "4 students made arrays using the same number of counters. Label each array with the student's name and find the total number of counters."
- 6 minutes: independent work time
- Share and record responses.
- Give each student 25 counters.

## Activity

- "Now you will work with a partner to see if you can make matching arrays."
- "Partner A will make an array using up to 25 counters. Don't let your partner see."
- "Give your partner clues about your array, so they can try to make it."
- "Compare to see if your partner made the same array, and then switch."
- 10 minutes: partner work time
- Monitor for students who gave clues using odd or even and used the rows and columns language correctly to share in the synthesis.

## Synthesis

- Invite previously identified students to share their clues.
- Students can use their counters to see if they make an array that matches the chosen student's.

## Student Responses

1. A. Elena  
B. Priya  
C. Kiran  
D. Han
2. 12 counters
3. Sample response: Student creates an array with 3 rows and 5 counters in each row.  
Sample student clues:
  - My array has an odd number of counters.
  - It has more columns than rows.
  - There are 3 rows.
  - There are 5 counters in each row.

- “Which clues helped you most when making your arrays?” (It was easy when they said how many rows and columns.)

## Advancing Student Thinking

If students give clues that are not related to the rows and columns of their array, consider asking or displaying:

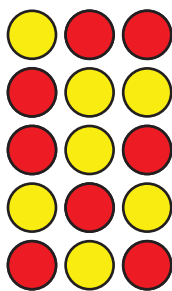
- “How many rows does your array have?”
- “How many columns does your array have?”
- “Does your array have more rows, more columns, or the same number of rows and columns?”

## Lesson Synthesis

🕒 10 min

“Today you learned that when arranging counters in an array, the counters in each row should line up with the counters in the other rows. The counters in an array also line up in columns that go up and down. The columns in an array always have the same number of counters in them. Arrays can help us organize objects, so we can find total amounts.”

Arrange counters to show:



“How would you describe this array using rows or columns?” (It has 3 columns with 5 counters in each. It has 5 rows with 3 counters in each. I can count by 5 to find the total. I see a group of 10 and a group of 5.)

### Suggested Centers

- Write Numbers (1–2), Stage 4: Skip Count by 2, 5, and 10 (Addressing)
- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)

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### Complete Cool-Down

#### Response to Student Thinking

Students identify the number of rows and how many in each row instead of the number of columns.

#### Next Day Support

- Create a poster with important terms or vocabulary from this cool-down.

## Lesson 9: A Sum of Equal Addends

### Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.3, 2.OA.C.4

Building Towards 3.OA.A.1

### Teacher-facing Learning Goals

- Represent the number of objects in an array as a sum of equal addends.

### Student-facing Learning Goals

- Let's match expressions with arrays.

### Lesson Purpose

The purpose of this lesson is for students to make connections between the structure of an array and expressions that represent the sum of the number of objects in each row or column in an array.

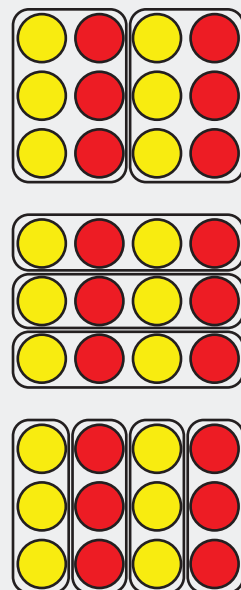
In this lesson, students match expressions with equal addends to arrays and find the total number of objects in an array by finding the value of these sums. The primary focus of the lesson is on relating sums with equal addends to the structure of the rows and columns in an array to build foundations for using arrays to represent multiplication in grade 3.

The arrays in the lesson also invite students to decompose the array in ways that make sense to them and it is important to recognize other ways students may use expressions to represent arrays.

For example, students might find the total number in the array by adding  $6 + 6$ . Although this expression does not directly match the structure of the rows and columns, it would be important to invite students to share why they chose this expression and how they may have used the rows or columns.

When students compare this expression to the sum of the number of counters in each column ( $3 + 3 + 3 + 3$ ) or the sum of the counters in each row ( $4 + 4 + 4$ ), it helps build conceptual foundations for multiplication and the properties of operations that will be explored in future grades.

For arrays that don't have the same number of rows as columns, there are 2 expressions that can represent the number of objects in the array.



**Access for:****🕒 Students with Disabilities**

- Representation (Activity 3)

**🌐 English Learners**

- MLR2 (Activity 2)

**Instructional Routines**

Card Sort (Activity 2), Estimation Exploration (Warm-up)

**Materials to Gather**

- Counters: Activity 1, Activity 3

**Materials to Copy**

- Match Arrays to Expressions Card Sort (groups of 2): Activity 2

**Lesson Timeline**

Warm-up	10 min
Activity 1	10 min
Activity 2	15 min
Activity 3	10 min
Lesson Synthesis	10 min
Cool-down	5 min

**Teacher Reflection Question**

As students worked in their small groups today, whose ideas were heard, valued, and accepted? How can you adjust the group structure tomorrow to ensure each student's ideas are a part of the collective learning?

**Cool-down** (to be completed at the end of the lesson)

🕒 5 min

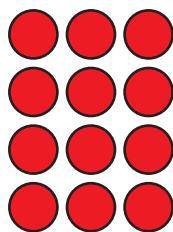
Match Expressions with Arrays

**Standards Alignments**

Addressing 2.OA.C.4

**Student-facing Task Statement**

1. Circle the **2** expressions that represent the rows and columns of the array.



$$4 + 4 + 4$$

$$3 + 3 + 3$$

$$4 + 4 + 4 + 4$$

$$3 + 3 + 3 + 3$$

2. How many counters are there in all?

### Student Responses

1.  $3 + 3 + 3 + 3$  and  $4 + 4 + 4$
2. 12 counters

## Begin Lesson

### Warm-up

🕒 10 min

Estimation Exploration: How Many Waffles?

### Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.4

The purpose of this Estimation Exploration is to practice the skill of making a reasonable estimate. Students consider how the arrangement of the objects helps them estimate the total number of objects (MP7). For the first image, students should keep their books closed and discuss estimates as a group. They will record their estimates after seeing the second image. In the synthesis, students discuss their confidence in their estimates of the total number of waffles on the tray even though they cannot see all the waffles. It is an opportunity to highlight how they look for and use the structure of rows and columns to justify their estimates.

## Instructional Routines

Estimation Exploration

### Student-facing Task Statement

How many waffles are on the tray?



Record an estimate that is:

too low	about right	too high

### Student Responses

Sample responses:

- Too low: 10 or fewer
- About right: 12–25
- Too high: more than 25

### Launch

- Groups of 2
- Have students keep their books closed.
- Display the first image:



- “How many waffles are on one tray?”
- “What is an estimate that’s too high?” “Too low?” “About right?”
- 1 minute: quiet think time

### Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Share responses.
- Display the second image:



- “Would you like to revise your thinking?”
- 1 minute: quiet think time
- Record responses.
- “How did the second image help you?”
- Share responses.

### Synthesis

- “Even though we can’t see the whole tray, some students are very confident about their estimates. Why do you think that is?” (If the tray is full, it has 5 rows with 4 in each row. Even though we can’t see all the waffles, we know how many fit.)

## Activity 1

Sums of Rows and Sums of Columns

🕒 10 min

👤 ↔ 👤 PLC Activity

### Standards Alignments

Addressing 2.OA.C.4

In the first section of the unit, students determined whether a group of objects had an even or odd number of members. They found the total number of objects in even groups by finding the sum of two equal addends or by skip counting by 2. In this activity, they analyze expressions that have more than two equal addends and connect these expressions to the structure of an array. The purpose of this activity is for students to recognize that an expression with equal addends

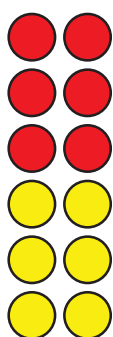
can represent the sum of the number of objects in each row or the sum of the number of objects in each column. When students analyze Diego and Mai's equations, they reason abstractly and quantitatively by relating the expressions to the array of dots (MP2).

## Materials to Gather

Counters

### Student-facing Task Statement

Mai and Diego represented the same array with different expressions.



Diego's expression

$$2 + 2 + 2 + 2 + 2 + 2$$

Mai's expression

$$6 + 6$$

Who do you agree with?

Show your thinking using diagrams, symbols, or other representations.

### Student Responses

Sample responses:

- I agree with Diego because you could count by twos to find the answer. Going down, I see groups of 2.
- I agree with Mai because there are 6 counters in each column.
- I agree with Mai and Diego because one looked at the columns and the other looked at the rows. They are both right.

### Launch

- Groups of 2
- Give students access to counters.

### Activity

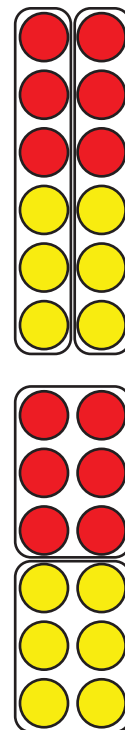
- "Mai and Diego represented the number of objects in the same array with different expressions. Diego wrote  $2 + 2 + 2 + 2 + 2 + 2$ . Mai wrote  $6 + 6$ ."
- "Who do you agree with? Work with a partner to decide who you agree with and be prepared to explain your reasoning."
- 1 minute: quiet think time
- 4 minutes: partner work time

### Synthesis

- "Some students agreed with Mai, some students agreed with Diego, and some students agreed with both. How can both expressions represent the array?" (One shows adding up the numbers in each row and one shows adding up the number in each column)
- "Which expression represents the sum of the number in each row? Explain." ( $2 + 2 + 2 + 2 + 2 + 2$  because there are 2 in each row.)
- "Mai's expression is  $6 + 6$ . What are the different ways Mai may see  $6 + 6$  in this array?" (She may see 6 red and 6 yellow counters. She may see 2 rows with 6

counters in each row.)

- Consider displaying and circling the counters to illustrate student thinking:



- “We can find the total number of objects in an array by adding up the number of objects in each row, or by adding up the number of objects in each column. We can represent these sums with expressions like the ones Mai and Diego wrote.”

## Activity 2

🕒 15 min

Card Sort: Arrays and Expressions

### Standards Alignments

Addressing 2.OA.C.4

The purpose of this activity is for students to connect expressions to the array structure. Students match arrays, 2 expressions, and the total number of objects represented. As they do so, they look for different ways of representing the number of objects in an array in terms of the columns or the rows (MP2, MP7). In the synthesis, student share how they found their matches and discuss why there was only 1 expression that represented the array that had the same number of rows as columns.

### Access for English Learners

*MLR2 Collect and Display.* Collect the language students use as they complete the card sort. Display words and phrases such as: “array,” “rows,” “columns,” “groups,” “equation,” “total,” “repeated addition,” and “skip count.” During the synthesis, invite students to suggest ways to update the display: “What are some other words or phrases we should include?” and so on. Invite students to borrow language from the display as needed.

*Advances: Conversing, Reading*

## Instructional Routines

Card Sort

## Materials to Copy

Match Arrays to Expressions Card Sort (groups of 2)

## Required Preparation

- Create a set of cards for each group of 2–3.

## Student-facing Task Statement

Your teacher will give you a set of cards that show arrays, expressions and a total number. Find the cards that match.

## Student Responses

Sample responses:

- A-P (or S)-R (or L)-X (or Z)
- B-N-Q-BB
- C-O-DD
- D-K-M-Y

## Launch

- Groups of 2–3
- Give each group a set of cards.

## Activity

- “Sort the cards into 8 groups.”
- “Each group should have an array, 2 expressions, and a total number.”
- “Each group has 4 cards, but one will only have 3.”
- 12 minutes: partner work time

- E-I-T-EE
- F-R (or L)-P (or S)-Z (or X)
- G-U-W-CC
- H-J-V-AA

### Synthesis

- Display Card A and Card F.
- Select students to share the expressions that match Card A and Card F ( $4 + 4 + 4 + 4 + 4$  and  $5 + 5 + 5 + 5$ )
- “How is it possible that these 2 arrays have the same expressions?” (Sample response:  $4 + 4 + 4 + 4 + 4$  shows the sum of the columns for the basketballs, but it shows the sum of the rows for notebooks.)
- Display Card C (popcorn in 3 rows of 3 bags).
- “What was different about this array?” (There was only 1 expression because the number of rows and columns are the same.)

## Activity 3

🕒 10 min

Add It All Up

### Standards Alignments

Addressing            2.OA.C.3, 2.OA.C.4  
 Building Towards    3.OA.A.1

The purpose of this activity is for students to determine the total number of objects in an array and match expressions to arrays by paying attention to the number of objects in each row and the number of objects in each column. For example, students recognize that 3 rows with 4 in each row would be  $4 + 4 + 4$ . The arrays in this task provide students opportunities to compare different ways an array could be decomposed to find the total number of objects. In the synthesis, students compare the different ways they find the total number of objects in the array to expressions that use equal addends to represent the sums of rows or sums of columns.

## Access for Students with Disabilities

*Representation: Develop Language and Symbols.* Support understanding of the problem by inviting students to use a blank piece of paper to cover counters and show each row in one expression, and then each column in the other expression. For example, in task 1, students will use a piece of paper to cover all counters except the first row of 4 counters, slide it down to reveal the second row of 4 counters, and slide it down one last time to show the last row of 4 counters ( $4 + 4 + 4$ ). Then, in a similar fashion, cover all counters but the first column of three counters, slide right to reveal the second column of three counters, and so on. ( $3 + 3 + 3 + 3$ )

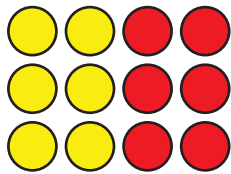
*Supports accessibility for: Visual-Spatial Processing, Organization*

## Materials to Gather

Counters

### Student-facing Task Statement

1. a. How many counters are there in all?



- b. Explain how you found the total number of counters.  
c. Circle **2** expressions that represent the array.

$$3 + 3 + 3 + 3$$

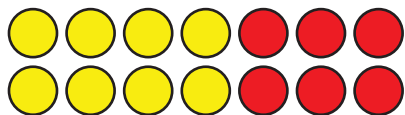
$$3 + 3 + 3$$

$$4 + 3$$

$$4 + 4 + 4$$

$$4 + 4 + 4 + 4$$

2. a. How many counters are there in all?



### Launch

- Give students access to counters.

### Activity

- “Now you will find the total number of counters in arrays using a method that makes sense to you. Then match each array to expressions.”
- 6 minutes: independent work time
- Monitor for the array that generates the largest variety of different ways students find the total number of counters in each array, including skip-counting or adding on based on the number in each row or column.

### Synthesis

- Invite previously identified students to share how they found the total for the same array. Record each method using an expression.
- If no student counted by adding the sum of each row or sum of each column, select a student to share the expressions they

- b. Explain how you found the total number of counters.
- c. Circle **2** expressions that represent the array.

$$2 + 2 + 2 + 2 + 2 + 2 + 2$$

$$6 + 6$$

$$7 + 7$$

$$2 + 2 + 2 + 2 + 2$$

### Student Responses

1.
  - a. 12 counters
  - b. Sample responses:
    - I saw 2 groups of 6. The red dots and yellow dots look like the pattern on number cubes.  
 $6 + 6 = 12$
    - I added  $4 + 4 = 8$ . Then I added 4 more to get 12.
  - c.  $3 + 3 + 3 + 3$  and  $4 + 4 + 4$
2.
  - a. 14 counters
  - b. Sample responses:
    - I saw 8 yellow and 6 red. I know  $8 + 6 = 14$
    - The first row was  $4 + 3 = 7$ . There are 2 rows, and I know  $7 + 7 = 14$ .
  - c.  $2 + 2 + 2 + 2 + 2 + 2 + 2 + 2$  and  $7 + 7$

circled to match the array.

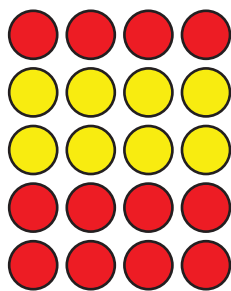
- “How are these expressions the same? How are they different?” (All the expressions show the total number of counters. They have different numbers of addends. They use different numbers. Some show a way to find the total, but they don’t match the number of counters in each row or each column.)

## Lesson Synthesis

🕒 10 min

“Today you learned that the number of objects in an array can be represented using expressions that show the sum of the number of objects in each row or the sum of the number of objects in each column.”

Display counters to show:



“What can you tell me about this array?” (It has 5 rows with 4 in each. It has 4 columns with 5 in each. An expression that represents the sum of the rows is  $4 + 4 + 4 + 4 + 4$ . An expression that represents the columns is  $5 + 5 + 5 + 5$ . There are 20 counters in all.)

Share and record responses.

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### Suggested Centers

- Write Numbers (1–2), Stage 4: Skip Count by 2, 5, and 10 (Addressing)
- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)

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### Complete Cool-Down

#### Response to Student Thinking

Students circle  $3 + 3 + 3$  or  $4 + 4 + 4 + 4$ .

#### Next Day Support

- Before the warm-up, have students work in partners to discuss a correct response to this cool-down.

# Lesson 10: Write Expressions and Equations to Represent Arrays

## Standards Alignments

Addressing 2.NBT.A.2, 2.OA.B.2, 2.OA.C.3, 2.OA.C.4

## Teacher-facing Learning Goals

- Represent the number of objects in each column or in each row of an array using equal addend equations.

## Student-facing Learning Goals

- Let's write equations to represent arrays.

## Lesson Purpose

The purpose of this lesson is for students to write equations to show the sum of the rows or columns of an array.

In a previous lesson, students matched arrays to expressions with equal addends. In this lesson, students write equations with equal addends to represent an array as the sum of the number of objects in each row or the sum of the number of objects in each column.

## Access for:

### Students with Disabilities

- Action and Expression (Activity 1)

### English Learners

- MLR2 (Activity 1)

## Instructional Routines

True or False (Warm-up)

## Materials to Gather

- Counters: Activity 1, Activity 2

## Lesson Timeline

Warm-up	10 min
Activity 1	15 min

## Teacher Reflection Question

What connections did students make between the structure of an array and the structure of the addition expressions they wrote? What

Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

questions did you ask to help make the connections more visible?

## Cool-down (to be completed at the end of the lesson)

🕒 5 min

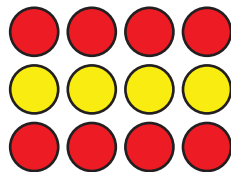
1 Array, 2 Equations

### Standards Alignments

Addressing 2.OA.C.4

### Student-facing Task Statement

Write 2 equations that represent the array and show the number in each row or each column.



$$\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

### Student Responses

$$4 + 4 + 4 = 12$$

$$3 + 3 + 3 + 3 = 12$$

----- Begin Lesson -----

## Warm-up

🕒 10 min

True or False: Expressions that Represent Arrays

## Standards Alignments

Addressing 2.OA.B.2, 2.OA.C.4

The purpose of this True or False is to elicit strategies and understandings students have for expressions with equal addends. Arrays are displayed for the first 2 equations as a support for students to explain how they know the equations are true.

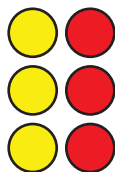
## Instructional Routines

True or False

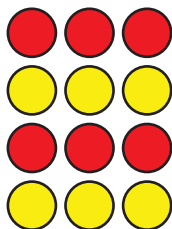
### Student-facing Task Statement

Decide if each statement is 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

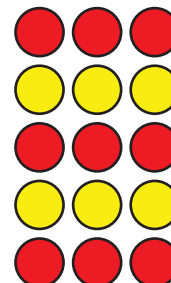
- Display one statement.
- "Give me a signal when you know whether the statement is true and can explain how you know."
- 1 minute: quiet think time

### Activity

- Share and record answers and strategies.
- Repeat with each statement.

### Synthesis

- Arrange counters to show 5 rows of 3 counters:



- "How could we make the last 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.)

## Activity 1

🕒 15 min

### Build Arrays and Write Equations

#### Standards Alignments

Addressing 2.NBT.A.2, 2.OA.C.3, 2.OA.C.4

The purpose of this activity is for students to write equations that represent the number of objects in the rows or columns of an array. In a previous lesson, students matched arrays to expressions. In this activity, they write their own equations and describe how each equal addend represents the number of counters in each row or each column.

#### 🌐 Access for English Learners

*MLR2 Collect and Display. Synthesis:* Direct attention to words collected and displayed from the previous lesson. Invite students to borrow language from the display as needed, and update it throughout the lesson.

*Advances: Conversing, Reading*

#### ♿ Access for Students with Disabilities

*Action and Expression: Develop Expression and Communication.* Invite students to show thinking using red and yellow counters. For example, show the rows using red in the first row, yellow in the second row, red in the third row, yellow in the 4th row, and so on. Then have students represent the columns using the two colors as well. This shows a concrete representation for each number in an expression.

*Supports accessibility for: Conceptual Processing, Organization*

#### Materials to Gather

Counters

#### Student-facing Task Statement

1. Use 20 counters to make an array with 4 rows.
  - a. How many columns does your array have?
  - b. Fill in the blanks to create equations

#### Launch

- Groups of 2
- Give students counters.

#### Activity

- “First, you will arrange counters to make an

with equal addends that represent the array.

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

2. Use 15 counters to make an array with 3 columns.
  - a. How many rows does your array have?
  - b. Fill in the blanks to create equations with equal addends that represent the array.

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

3. Choose an even number of counters between 6 and 24. Make an array.
  - a. How many rows does your array have?
  - b. How many columns does your array have?
  - c. Write equal addends equations that represent the array.

### Student Responses

1.
  - a. 5 columns
  - b.  $5 + 5 + 5 + 5 = 20$  and  $4 + 4 + 4 + 4 + 4 = 20$
2.
  - a. 5 rows
  - b.  $3 + 3 + 3 + 3 + 3$  and  $5 + 5 + 5$
3. Answers vary.

array. Then you will write an equation that has equal addends. There are 2 equations that match each array. To find the total number of counters, you can use any method that makes sense to you."

- 6 minutes: independent work time
- "For number 3, work with a partner. You should each make your own array and follow the steps. Then show your partner your array and let them answer the same questions. Check to see if you agree."
- 6 minutes: partner work time
- Monitor for students to share different equations for an array they create that uses between 6 and 24 counters.

### Synthesis

- Invite previously identified students to share their arrays and ask others to decide how many rows and columns the student's array could have.
- "\_\_\_\_ wrote this equation. How many rows and columns could \_\_\_\_'s array have?"

### Advancing Student Thinking

If students create equations that do not match their array, consider asking:

- "How do the addends in your equation match your array?"
- "How does the number of addends in your equation match your array?"

- “Does the sum of your equation match the total number of counters?”

## Activity 2

⌚ 20 min

### Arrange Veggies to Make Arrays

#### Standards Alignments

Addressing 2.NBT.A.2, 2.OA.C.3, 2.OA.C.4

The purpose of this activity is for students to practice writing equations with equal addends to represent the number of objects in each row or column of an array. They create arrays based on the context of a vegetable garden and compare different arrangements of their crops (MP2).

#### Materials to Gather

Counters

#### Student-facing Task Statement

1. Make an array that shows how to plant 9 potatoes. Draw it.  
Write an equation to represent your array.
2. Make an array that shows how to plant 16 carrot seeds. Draw it.  
Write an equation to represent your array.
3. Make an array that shows how to plant 15 potatoes. Draw it.  
Write an equation to represent your array.
4. Make an array that shows how to plant 12 carrot seeds. Draw it.  
Write an equation to represent your array.

#### Student Responses

1. Sample response:

#### Launch

- Groups of 2
- Give students access to counters.
- “What do you know about growing plants?” (Plants need soil, water, and sunlight. You can grow plants to eat them. You can grow flowers. Plants can grow inside or outside.)
- 1 minute: quiet think time
- 1–2 minutes: partner discussion
- Share responses.
- “How are plants arranged in gardens or in fields?” (Sometimes the same plants are together. Flowers might be mixed up to make a design. On a farm, some plants are arranged in rows.)

- Students draw an array with 3 rows of 3 potatoes.  $3 + 3 + 3 = 9$
2. Sample responses:
- Students draw an array with 4 rows of 4 seeds.  $4 + 4 + 4 + 4 = 16$
  - Students draw an array with 8 rows of 2 seeds.  $8 + 8 = 16$  or  $2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = 16$
  - Students draw an array with 2 rows of 8 seeds.  $8 + 8 = 16$  or  $2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = 16$
3. Sample response:
- Students draw an array with 3 rows of 5 potatoes.  $3 + 3 + 3 + 3 + 3 = 15$  or  $5 + 5 + 5 = 15$
  - Students draw an array with 5 rows of 3 potatoes.  $3 + 3 + 3 + 3 + 3 = 15$  or  $5 + 5 + 5 = 15$
4. Sample response:
- Students draw an array with 2 rows of 6 seeds.  
 $2 + 2 + 2 + 2 + 2 + 2 = 12$  or  $6 + 6 = 12$
  - Students draw an array with 3 rows of 4 seeds.  $3 + 3 + 3 + 3 = 12$  or  $4 + 4 + 4 = 12$

### Activity

- “The local farmer needs help arranging crops in the vegetable garden. Based on the number of veggies planted, draw arrays to show how each crop could be arranged. Use counters if it helps.”
- 10 minutes: independent work time
- Monitor for a variety of ways students arrange the 16 carrot seeds, including 4 rows of 4.

### Synthesis

- Invite 2–3 previously identified students to share how they arranged 16 carrot seeds. Select the student who arranged in 4 rows of 4 carrots seeds last.
- If no student arranged the carrots seeds in 4 rows, arrange counters to show 4 rows of 4 counters.
- “What equation would represent the array using equal addends?” ( $4 + 4 + 4 + 4 = 16$ )
- “Do the addends represent the number of carrot seeds in each row or in each column?” (It could represent both.)
- “Can you find another equation that shows the number in each row or each column?” (No, since there are the same number of rows and columns, there is only one equation.)

### Advancing Student Thinking

If students represent the crops using one row or multiple rows with 1 in each, consider asking:

- “Is there another way to arrange the crops so there are at least 2 rows?”

## Lesson Synthesis

🕒 10 min

"Today you learned that you can write equations to show the sum of the number of objects in rows or columns of arrays."

Arrange counters to show:



"Elena wrote  $6 + 6 = 12$  as an equation to represent the number of objects in this array. Do you agree? Explain." (Yes, but it doesn't show the number in the rows or the number in the columns.  $6 + 6$  can help us find the total, but the equations  $4 + 4 + 4 = 12$  or  $3 + 3 + 3 + 3 = 12$  show the sum of the rows or columns.)

---

### Suggested Centers

- Write Numbers (1–2), Stage 4: Skip Count by 2, 5, and 10 (Addressing)
- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)

---

### Complete Cool-Down

#### Response to Student Thinking

Students write equations that do not represent the rows and columns of the array shown.

#### Next Day Support

- Before the warm-up, pass back the cool-down and work in small groups to make corrections.

# Lesson 11: Arrays and Rectangles

## Standards Alignments

Addressing 2.G.A.2, 2.OA.C.3, 2.OA.C.4

Building Towards 2.G.A.2

## Teacher-facing Learning Goals

- Create arrays using square tiles and partially-partitioned rectangles.

## Student-facing Learning Goals

- Let's make arrays and rectangles using tiles.

## Lesson Purpose

The purpose of this lesson is for students to see that a rectangle partitioned into equal-size squares is composed of squares that are arranged in rows and columns.

In an earlier unit, students composed larger shapes from composite shapes and partitioned rectangles to make halves, thirds, or fourths. Although they have experience 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-size squares.

In this lesson, students partition rectangles into equal-size squares with support. They make the connection between an array of individual objects that don't touch each other and a partitioned rectangle with 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 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 (MP7). This work prepares students to learn about the area in grade 3.

## Access for:

### Students with Disabilities

- Representation (Activity 1)

### English Learners

- MLR8 (Activity 2)

## Instructional Routines

Which One Doesn't Belong? (Warm-up)

## Materials to Gather

- Colored pencils or crayons: Activity 1, Activity 2
- Inch tiles: Activity 1
- Rulers: Activity 2

## Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

## Teacher Reflection Question

How can you support students as they partition rectangles to get as close to equal-size squares as possible and developmentally appropriate? What tools can you offer to help guide them?

## Cool-down (to be completed at the end of the lesson)

🕒 5 min

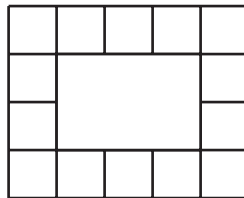
### Partition Rectangles into Squares

#### Standards Alignments

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

#### Student-facing Task Statement

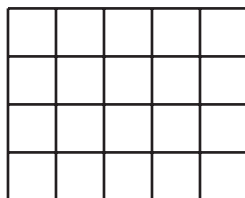
1. Draw lines so the rectangle is completely filled with equal-size squares.



2. Write 2 equations to represent the number of equal-size squares in the rectangle.

#### Student Responses

- 1.



2.  $4 + 4 + 4 + 4 + 4 = 20$   
 $5 + 5 + 5 + 5 = 20$

---

## Begin Lesson

### Warm-up

🕒 10 min

Which One Doesn't Belong: All Kinds of Arrays

#### Standards Alignments

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

This warm-up prompts students to carefully analyze and compare different arrays. 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.

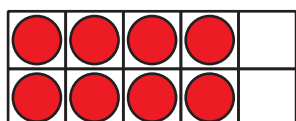
#### Instructional Routines

Which One Doesn't Belong?

#### Student-facing Task Statement

Which one doesn't belong?

A



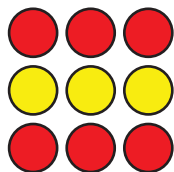
B



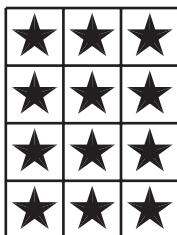
#### Launch

- Groups of 2
- Display the image.
- "Pick one that doesn't belong. Be ready to share why it doesn't belong."
- 1 minute: quiet think time

C



D



### Student Responses

- A is the only one that doesn't look like all the rows and columns are filled.
- B is the only one that isn't a diagram.
- C is the only one that isn't an even number
- D is the only one that doesn't have fewer than 10 objects.

### Activity

- "Discuss your thinking with your partner."
- 2-3 minutes: partner discussion
- Record responses.

### Synthesis

- "What do B, C, 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-size squares."

## Activity 1

15 min

### Use Tiles to Make Arrays

#### Standards Alignments

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

The purpose of this activity is to make connections between arranging objects to make an array and making a rectangle from equal-size squares. They use the language of arrays to describe the rectangles they create (MP6) and learn that a rectangle composed of equal-size squares is an example of an array.

#### Access for Students with Disabilities

*Representation: Develop Language and Symbols.* Activate background knowledge. Have students recall the term "array" and ask, "What makes an array?" and "Tell me more about the rows and columns, are the rows/columns equal/unequal?"

*Supports accessibility for: Memory, Language*

## Materials to Gather

Colored pencils or crayons, Inch tiles

## Student-facing Task Statement

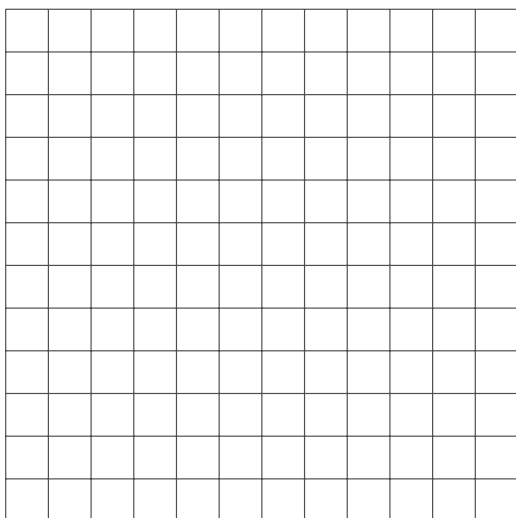
Choose a number of tiles.

12          15          16          18

20

Arrange all 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.



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

Sample response:

1. Students shade a rectangle composed of 2

## Launch

- Groups of 2
- Give students inch tiles and colored pencils.
- Arrange 6 tiles into an array with 2 rows and 3 columns. Pause, then push them together to make a rectangle.
- “What do you notice? What do you wonder?” (There are 6 squares. The squares make a rectangle. You made an array first, then you pushed them together and made a rectangle. Is the rectangle an array of squares? Why did you push them together? Could you make other rectangles?)

## Activity

- “You and your partner can choose 12, 15, 16, 18, or 20 tiles. Arrange all the tiles in an array. Then push them together to make a rectangle.”
- “Shade in the same arrangement of 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 a variety of different rectangles to display during the synthesis.

## Synthesis

- Display student work.
- “Describe this rectangle.” (It has \_\_\_\_\_ rows

rows of 6 squares.

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

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

🕒 20 min

### Make Equal-size Squares

#### Standards Alignments

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

The purpose of this activity is for students to finish partitioning a rectangle into equal-size squares. This work will prepare students for partitioning rectangles on their own in later lessons. In the synthesis, students are invited to use what they know about the structure of arrays to anticipate how many equal-size squares will fill the rectangle without drawing any lines (MP8).

#### Access for English Learners

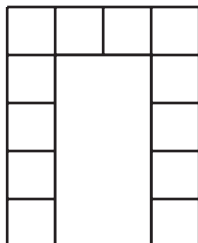
*MLR8 Discussion Supports.* Synthesis: At the appropriate time, give students 2–3 minutes to make sure that everyone in their group can explain how they know how many squares will fill the rectangle. Invite groups to rehearse what they will say when they share with the whole class.  
*Advances: Speaking, Conversing, Representing*

#### Materials to Gather

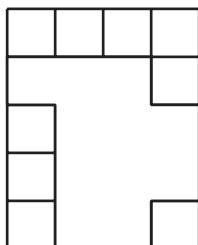
Colored pencils or crayons, Rulers

## Student-facing Task Statement

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



- b. Color the rows different colors.
  - c. How many rows of equal-size squares are there?
  - d. How many squares are in each row?
  - e. Write an equation to represent the sum of the squares in each row.
2. a. Draw lines so that the rectangle is completely filled with equal-size squares.



- b. Color the columns different colors.
  - c. How many columns of equal-size squares are there?
  - d. How many squares are in each column?
  - e. Write an equation that represents the sum of squares in each column.
3. a. Draw lines so that the rectangle is completely filled with equal-size squares.

## Launch

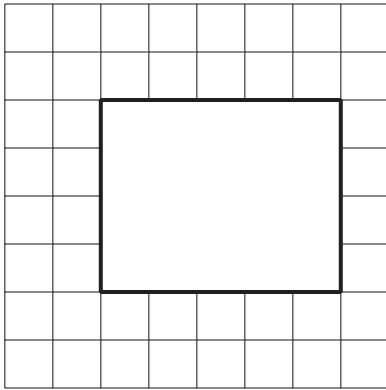
- Give each student at least 2 different colors of colored pencils or crayons and a ruler.

## Activity

- “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-size squares by drawing lines with a ruler. For each rectangle, there will be some squares already outlined. Draw lines to continue making equal-size squares inside each rectangle.”
- “After making the squares, use colored pencils or crayons to show patterns in the rows or columns.”
- 10 minutes: independent work time

## Synthesis

- Display the rectangle that has 4 squares in the first row, but is missing squares in each column.
- “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.)

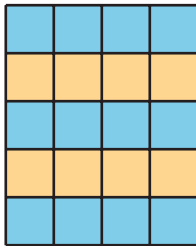


- b. How many columns of equal-size squares are there? How many squares are in each column?
- c. How many rows of equal-size squares are there? How many squares are in each row?
- d. Write 2 equations to represent the number of equal-size squares in the rectangle.

### Student Responses

1.

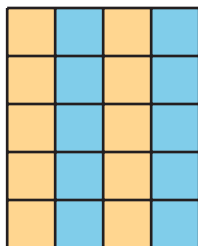
- a. Rectangle shows 5 rows of 4 equal-size squares.



- b. 5 rows
- c. 4 squares in each row
- d.  $4 + 4 + 4 + 4 + 4 = 20$

2.

- a. Rectangle shows 4 columns of 5 equal-size squares



- b. 4 columns
  - c. 5 squares in each column
  - d.  $5 + 5 + 5 + 5 = 20$
- 3.
- a. Rectangle has 4 rows of 5 equal-size squares
  - b. 5 columns and 4 squares in each column
  - c. 4 rows and 5 squares in each row
  - d.  $4 + 4 + 4 + 4 + 4 = 20$   
 $5 + 5 + 5 + 5 = 20$

### Advancing Student Thinking

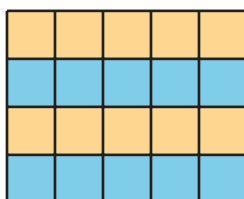
If students create squares one by one or create squares that are significantly different in size, consider pairing them with a peer who uses a ruler or looks for ways to draw longer lines across rows and columns. Ask students to compare their techniques and try each other's techniques to complete one row or column of squares.

## Lesson Synthesis

🕒 10 min

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

Create or draw a rectangle with inch tiles to show:



---

“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-size squares inside the rectangle?” (20)

---

### Suggested Centers

- Write Numbers (1–2), Stage 4: Skip Count by 2, 5, and 10 (Addressing)
- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)

---

### Complete Cool-Down

---

### Response to Student Thinking

Students create more than or fewer than 6 equal-size squares to complete the space in the rectangle or write expressions that do not represent the number of squares in the rectangle.

### Next Day Support

- Launch the warm-up or activities by highlighting important representations from previous lessons.

## Lesson 12: Partition Rectangles into Squares

### Standards Alignments

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

Building Towards 3.MD.C

### Teacher-facing Learning Goals

- Partition rectangles into rows and columns of equal-size squares, and count to find the total number of squares.

### Student-facing Learning Goals

- Let's partition rectangles into squares.

### Lesson Purpose

The purpose of this lesson is for students to partition rectangles into equal-size 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 equal-size squares. In this lesson, students partition rectangles into equal-size 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 each row or the number of squares in each column. Monitor for the ways students use what they know about the structure of arrays to plan and partition their rectangles. It is not important that students partition the rectangles into exactly equal-size squares.

This lesson has a Student Section Summary.

### Access for:

#### Students with Disabilities

- Action and Expression (Activity 2)

#### English Learners

- MLR2 (Activity 1)

### Instructional Routines

Estimation Exploration (Warm-up)

### Materials to Gather

- Inch tiles: Activity 1, Activity 2
- Rulers: Activity 1, Activity 2

**Lesson Timeline**

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Lesson Synthesis	10 min
Cool-down	5 min

**Teacher Reflection Question**

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

**Cool-down** (to be completed at the end of the lesson)

🕒 5 min

How Many Squares?

**Standards Alignments**

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

**Student-facing Task Statement**

1. Partition the rectangle into equal-size squares.



2. How many rows of equal-size squares did you make?
3. How many columns of equal-size squares did you make?
4. Write an equation that represents the number of squares in the rectangle.

**Student Responses**

Sample response:

1. The rectangle is split into 4 rows of 2 equal-size squares.
2. 4 rows
3. 2 columns
4.  $4 + 4 = 8$  or  $2 + 2 + 2 + 2 = 8$

---

## Begin Lesson

### Warm-up

🕒 10 min

Estimation Exploration: Fill it Up

#### Standards Alignments

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

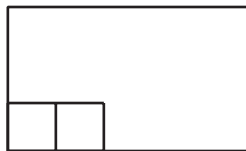
The purpose of this Estimation Exploration is to practice the skill of making a reasonable estimate. Students consider how the placement of the first 2 squares can help them think about the total number of squares needed to fill the rectangle (MP7). These understandings will be helpful later when students will need to partition rectangles into equal-size squares.

#### Instructional Routines

Estimation Exploration

#### Student-facing Task Statement

How many little squares would fill the rectangle?



Record an estimate that is:

#### Launch

- Groups of 2
- Display the image.
- “How many little squares would fill the rectangle?”
- “What is an estimate that’s too high?” “Too low?” “About right?”
- 1 minute: quiet think time

too low	about right	too high

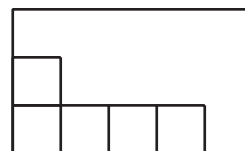
## Student Responses

Sample response:

- Too low: 1–11
- About right: 12–20
- Too high: more than 21

## Activity

- “Discuss your thinking with your partner.”
- 1 minute: partner discussion
- Record responses.
- Draw equal-size squares to show:



- “Would you like to revise your thinking?”
- 1 minute: quiet think time
- Share responses.

## Synthesis

- “How did the second image help you revise your thinking?”
- 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

🕒 15 min

How Many Squares?

### Standards Alignments

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

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

## Access for English Learners

*MLR2 Collect and Display.* Synthesis: Direct attention to words collected and displayed from the previous lessons. Include the word “partition.” Invite students to borrow language from the display as needed, and update it throughout the lesson.

*Advances: Conversing, Reading*

## Materials to Gather

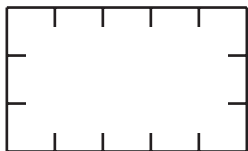
Inch tiles, Rulers

### Student-facing Task Statement

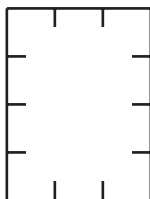
1. Build a rectangle with 8 tiles arranged in 2 rows. Use a ruler to partition the rectangle to match the rectangle you made.



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



- a. How many rows of equal-size squares did you make?
  - b. How many columns did you make?
  - c. Write 2 equations to represent the total number of equal-size squares.
3. Use a ruler to partition the rectangle using the tick marks as a guide.



### Launch

- Groups of 2
- Give students rulers and inch tiles.

### Activity

- “Use 8 tiles to make a rectangle. Your tiles should be in 2 rows.”
- 1 minute: independent work time
- “Now, draw lines in the rectangle to show the squares. It should have the same number of equal-size 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-size squares. You can also use the tiles to build it first, if that helps.”
- 10 minutes: independent work time

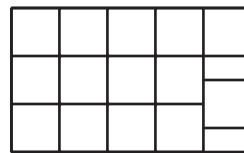
### Synthesis

- Invite 1–2 students to share their rectangles and equations for their rectangle with 3 rows and 5 columns. ( $3 + 3 + 3 + 3 + 3 = 15$  or  $5 + 5 + 5 = 15$ )
- Draw a rectangle and partition to show:

- How many rows of equal-size squares did you make?
- How many columns did you make?
- Write 2 equations to represent the total number of equal-size squares.

### Student Responses

- Students partition the rectangle to show 2 rows of 4 equal-size squares.
- 3 rows
  - 5 columns
  - $3 + 3 + 3 + 3 + 3 = 15$   
 $5 + 5 + 5 = 15$
- 4 rows
  - 3 columns
  - $4 + 4 + 4 = 12$   
 $3 + 3 + 3 + 3 = 12$



- “How is this partition different from what we did in this activity?” (The squares aren't the same size and the last column has 4 not 3.)

### Advancing Student Thinking

If students create equations that match the total number of squares, but do not represent the sum of squares in each row or the sum of squares in each column, consider asking:

- “How does your equation match the array?”
- “Can you write an equation with equal addends that shows the sum of each row or column?”

## Activity 2

🕒 20 min

### Partition Rectangles

#### Standards Alignments

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

The purpose of this activity is for students to partition rectangles into rows and columns of equal-size squares. They use tiles to help them see how to draw lines to partition the rectangles. Although it is important for students to use what they know about the structure of arrays and composing rectangles from squares to partition the rectangles (MP7), it is not necessary that students' drawings are perfect. As long as it is clear that the student intended for the squares to be equal in size and they can articulate their reasoning. If their squares are significantly different or result in more squares in one column or row than another, offer a ruler and consider having students trace tiles for practice or guidance.

### Access for Students with Disabilities

*Action and Expression: Develop Expression and Communication.* Give students access to 1-inch grid paper to get their thinking started, and create an array with the inch tiles. Have students transfer what they made on the grid paper to the open rectangles given. The concrete image transferred to the more abstract image may help some students visually.

*Supports accessibility for: Visual-Spatial Processing, Organization*

## Materials to Gather

Inch tiles, Rulers

### Student-facing Task Statement

1. Use 12 tiles to make a rectangle. Split one of the rectangles into equal-size squares to match your rectangle made of tiles.

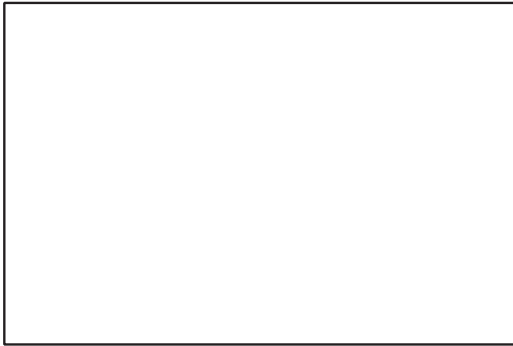


### Launch

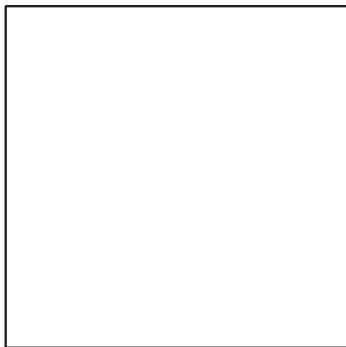
- Groups of 2
- Give students rulers and inch tiles.

### Activity

- “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?”



- a. Write 2 equations to represent the total number of squares.
2. Split this rectangle into equal-size squares.



- a. Write 2 equations to represent the total number of squares.
3. Split this rectangle into equal-size squares.



- a. Write 2 equations to represent the total number of squares.

### Student Responses

1. Sample response: Students partition a rectangle into 6 rows of 2 equal-size

(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-size 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.

### Synthesis

- Invite previously identified students to 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.)

squares.

a.  $2 + 2 + 2 + 2 + 2 + 2 = 12$   
 $6 + 6 = 12$

2. Sample response: Students partition the rectangle into 3 rows of 3 equal-size squares.

a.  $3 + 3 + 3 = 9$   
 $3 + 3 + 3 = 9$

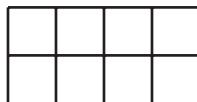
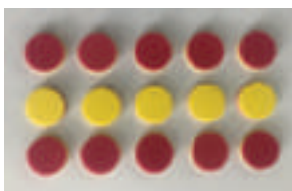
3. Sample response: Students partition the rectangle into 3 rows of 5 equal-size squares.

a.  $5 + 5 + 5 = 15$   
 $3 + 3 + 3 + 3 + 3 = 15$

## Lesson Synthesis

🕒 10 min

Display a variety of arrays and rectangles from the unit, such as:



**B**



“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?”

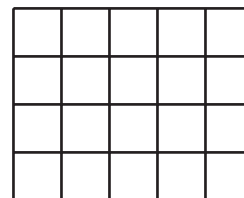
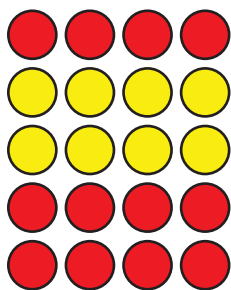
Share and record responses.

## Suggested Centers

- Write Numbers (1–2), Stage 4: Skip Count by 2, 5, and 10 (Addressing)
- Target Numbers (1–5), Stage 7: Subtract Hundreds, Tens, or Ones (Supporting)

## Student Section Summary

In this section, we learned that arrays are groups of objects that are organized into rows and columns. Arrays have the same number of objects in each row and the same number of objects in each column. We practiced different ways to count the objects in an array and used expressions with equal addends to show that you can find the total objects in an array by adding the sum of each row or the sum of each column. We also learned that rectangles can be composed of an array of equal-size squares. We practiced partitioning rectangles into rows and columns of equal-size squares.



$$4 + 4 + 4 + 4 + 4 = 20 \quad \text{or} \\ 5 + 5 + 5 + 5 = 20$$

## ----- Complete Cool-Down -----

### Response to Student Thinking

Students create squares that are significantly different sizes or write expressions that do not match the array.

### Next Day Support

- Before the warm-up, select a student's cool-down from the previous lesson (name anonymous). Ask students to identify what the student did well and what the student needs to do to improve the cool-down.

## Lesson 13: Center Day 2 (Optional)

### Standards Alignments

Addressing 2.NBT.A.2, 2.NBT.B.7

### Teacher-facing Learning Goals

- Add and subtract within 1,000 using strategies based on place value and the properties of operations.
- Skip-count by 2, 5, and 10.

### Student-facing Learning Goals

- Let's skip-count and practice addition and subtraction.

### Lesson Purpose

The purpose of this lesson is for students to skip-count by 2, 5, and 10 and to add and subtract within 1,000.

This lesson is optional because it is an opportunity for extra practice that not all classes may need. In this lesson students have another chance to practice skip-counting by 2, 5, and 10 and addition and subtraction within 1,000.

### Instructional Routines

True or False (Warm-up)

### Materials to Gather

- Materials from previous centers: Activity 1

### Lesson Timeline

Warm-up	10 min
Activity 1	40 min
Lesson Synthesis	10 min

### Teacher Reflection Question

Identify something you thought was going to go well in math class recently, but did not. What can you do to make it a success the next time?

----- Begin Lesson -----

## Warm-up

 10 min

### True or False: Two or False

The purpose of this True or False is to elicit strategies and understandings students have for adding 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.

### Instructional Routines

True or False

#### Student-facing Task Statement

Decide if each statement is 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: I can do  $2 + 2$  two times to make  $4 + 4$ .
- True: I can split one 2 into  $1 + 1$  and add 1 to each other 2.  $2 + 1 + 2 + 1 = 3 + 3$
- False: I saw I could do  $2 + 2$  three times to make  $4 + 4 + 4$  and I know this is more than  $5 + 5$ .

#### Launch

- Display one statement.
- "Give me a signal when you know whether the statement is true and can explain how you know."
- 1 minute: quiet think time

#### Activity

- Share and record answers and strategy.
- Repeat with each statement.

#### Synthesis

- "How can you explain your answer without finding the value of both sides?"

## Activity 1

 40 min

Centers: Choice Time

### Standards Alignments

Addressing 2.NBT.A.2, 2.NBT.B.7

The purpose of this activity is for students to have another chance to practice skip-counting by 2, 5, and 10 and addition and subtraction within 1,000.

## Materials to Gather

Materials from previous centers

## Required Preparation

Gather materials from:

- Write Numbers, Stage 4
- Target Numbers, Stages 6 and 7
- Five in a Row, Stages 7 and 8
- How Close, Stage 4

## Student-facing Task Statement

Choose a center.

Write Numbers



Target Numbers



Five in a Row



How Close



## Launch

- “Now you will choose from centers we have already learned.”
- Display the center choices in the student book.
- “Think about what you would like to do first.”
- 30 seconds: quiet think time

## Activity

- Invite students to work at the center of their choice.
- 15–20 minutes: center work time
- “Choose what you would like to do next.”
- 15–20 minutes: center work time
- If time allows, have students choose a third center to work on.

## Synthesis

- Invite 2-3 students to share their favorite method for adding and subtracting within 1,000.

## Lesson Synthesis

🕒 10 min

“We have learned a lot about addition and subtraction this year. What are some important things we need to remember about addition and subtraction?”

Share and record responses.

“What questions do you have about addition and subtraction?”

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Family Support  
Materials

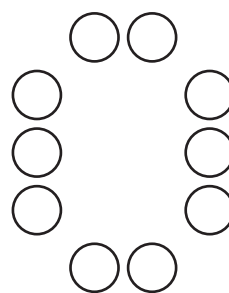
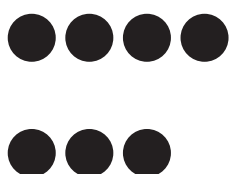
# Family Support Materials

## Equal Groups

In this unit, students develop an understanding of equal groups as the foundation for multiplication and division in grade 3 and beyond. This understanding builds on students' experiences with skip counting and finding the sums of equal addends.

### Section A: Odd and Even

In this section, students build on their personal experiences with sharing equal groups of objects and making pairs to define the terms odd and even. They begin by noticing that some groups of objects can be made into two equal groups without a "leftover" and other groups can be made into two equal groups with "1 leftover." They notice this same pattern when pairing objects. After the terms even and odd are introduced, students focus on justifying why a group has an even or odd number of members by showing whether the objects can be made into two equal groups, whether the objects can be paired without a leftover, or whether they can skip-count by 2 to count the total number of objects.



## Section B: Rectangular Arrays

In this section, students are introduced to rectangular arrays. They learn that rectangular arrays contain objects arranged into rows and columns. They recognize that each row has the same number of objects and each column has the same number of objects. Using this structure, students can skip count by the number in each row or the number in each column to find the total number of objects.

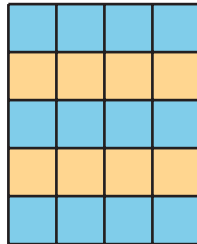
In addition to skip counting, students learn that they can write equations with equal addends to represent the total number of objects in a rectangular array. Students connect these equations to the structure of the array and describe how equations can show the total number of objects as the sum of the objects in each row or the sum of the objects in each column.

Students also connect their work with arrays to their previous work with partitioning shapes into equal-size pieces. Starting with a rectangle, students partition them into equal-sized squares by considering rows and columns. Rectangles in this section have up to 5 rows and 5 columns. Students use the structure of the rows and columns created by the partitions in the rectangle to count the total number of equal-sized squares.

## Try it at home!

Near the end of the unit, ask your student to do the following problems:

Write 2 equations to represent the total number of squares.



Questions that may be helpful as they work:

- How many rows?
- How many columns?
- How does each equation match the array?

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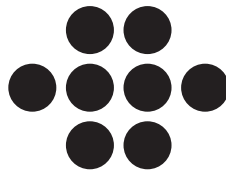
# Unit Assessments

Check Your Readiness A and B  
End-of-Unit Assessment

# Equal Groups: Section A Checkpoint

1. Lin has 15 socks. Can Lin put all the socks in pairs with no socks leftover? Explain or show your reasoning.

2. a. Is there an even or odd number of dots? Explain your reasoning.

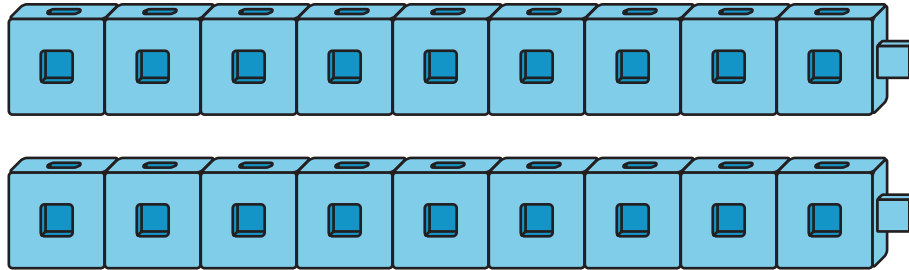


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b. Is there an even or odd number of connecting cubes? Explain your reasoning.



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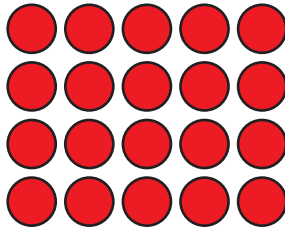
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3. Andre has 18 pencils. Write an equation with two equal addends to show that Andre has an even number of pencils.

$$\underline{\quad\quad} + \underline{\quad\quad} = \underline{\quad\quad}$$

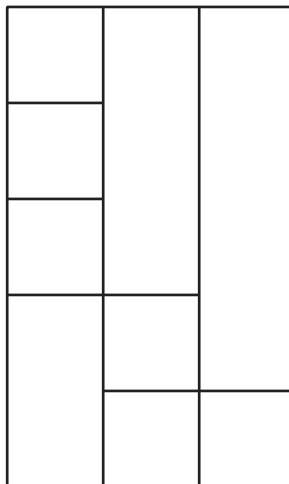
## Equal Groups: Section B Checkpoint

1. a. How many circles are in the array?



- b. Write 2 equal addend equations to represent the total number of circles.

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



- b. Write an equation to represent the total number of equal-size squares.

## Equal Groups: End-of-Unit-Assessment

1. Han and Priya each have some pencils. Han has the same number of pencils as Priya. Select **3** statements which could be true.

A. Han has an odd number of pencils.

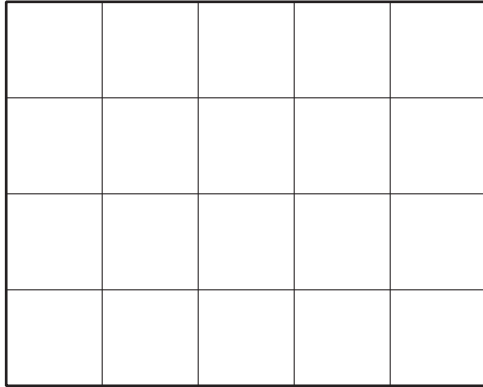
B. Priya has an even number of pencils.

C. Han has an odd number of pencils and Priya has an even number of pencils.

D. Han and Priya together have an odd number of pencils.

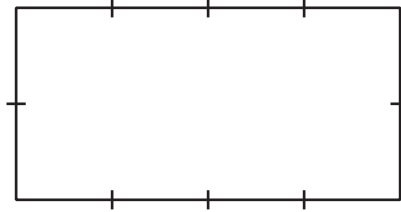
E. Han and Priya together have an even number of pencils.

2. Mai split the rectangle into equal-size squares. Select 3 correct statements about the diagram.



- A. The total number of equal-size squares is  $5 + 5 + 5 + 5$ .
- B. The total number of equal-size squares is  $4 + 4 + 4 + 4$ .
- C. The total number of equal-size squares is  $5 + 5 + 5 + 5 + 5$ .
- D. The total number of equal-size squares is  $4 + 4 + 4 + 4 + 4$ .
- E. The total number of equal-size squares in the array is even.
- F. The total number of equal-size squares in the array is odd.

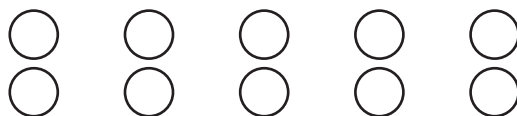
3. a. Draw lines so the rectangle is completely filled with equal-size squares.



- b. How many equal-size squares are there?

4. For each image, determine whether there are an even or odd number of circles. Explain your reasoning.

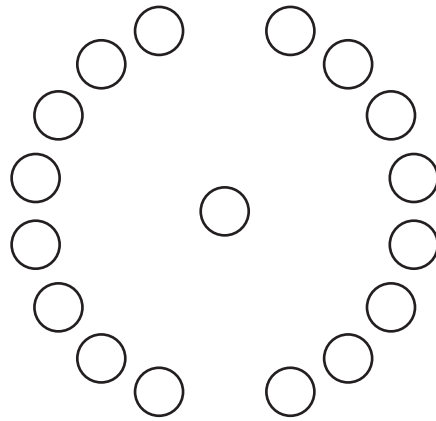
a.



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b.

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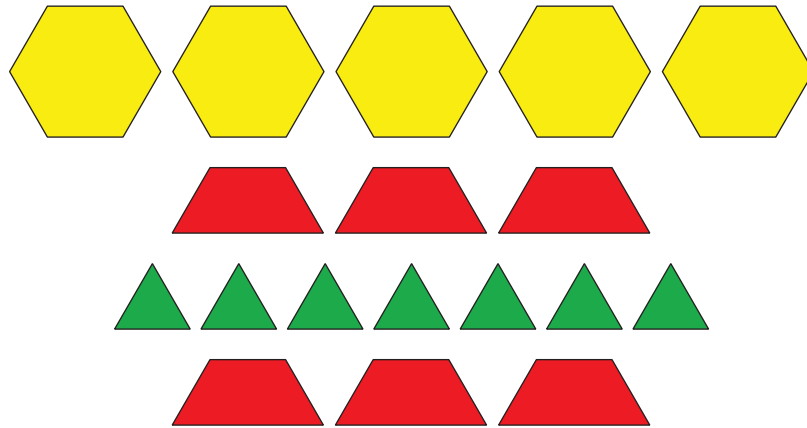
5. For each number, decide whether the number is even or odd. Write each even number as the sum of 2 equal addends.

a. 6

b. 11

c. 14

6. Here are some pattern blocks that Jada and Diego want to share.



a. Explain why there are an even number of trapezoids.

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b. Jada says that she and Diego can share the pattern blocks so they each have 9 pattern blocks. Explain why Jada is correct.

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c. Can Jada and Diego share all of the pattern blocks so that they each have the same set of pattern block shapes? Explain or show your reasoning.

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# Assessment Answer Keys

Check Your Readiness A and B  
End-of-Unit Assessment

# Assessment Answer Keys

## Assessment: Section A Checkpoint

### Problem 1

#### Goals Assessed

- Determine whether a group of objects (up to 20) has an odd or even number of members.

Lin has 15 socks. Can Lin put all the socks in pairs with no socks leftover? Explain or show your reasoning.

### Solution

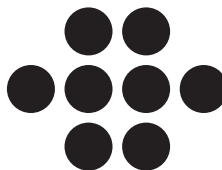
No, she can make 7 pairs of socks and that makes  $7 + 7$  or 14 socks but then there is 1 sock left over.

### Problem 2

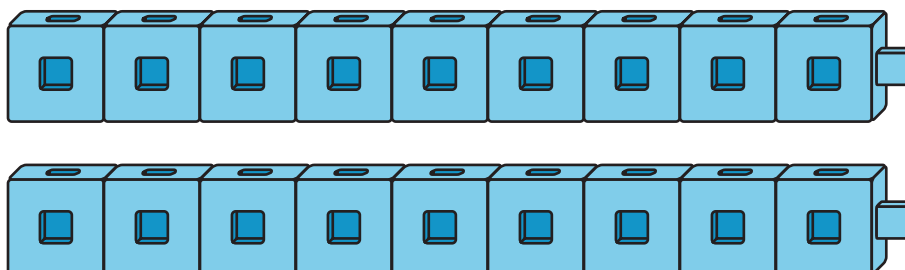
#### Goals Assessed

- Determine whether a group of objects (up to 20) has an odd or even number of members.

- a. Is there an even or odd number of dots? Explain your reasoning.



- b. Is there an even or odd number of connecting cubes? Explain your reasoning.



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**Solution**

- a. Even, because I can put the circles into 4 pairs.
- b. Even, because each connecting cube in one tower matches with a connecting cube in the other tower.

**Problem 3****Goals Assessed**

- Write an equation to express an even number as a sum of two equal addends.

Andre has 18 pencils. Write an equation with two equal addends to show that Andre has an even number of pencils.

$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

**Solution**

$$9 + 9 = 18$$

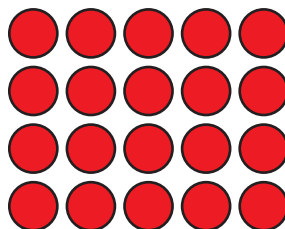
## Assessment: Section B Checkpoint

### Problem 1

#### Goals Assessed

- Find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns using addition.
- Represent the total number of objects in an array as a sum of equal addends.

a. How many circles are in the array?



b. Write 2 equal addend equations to represent the total number of circles.

### Solution

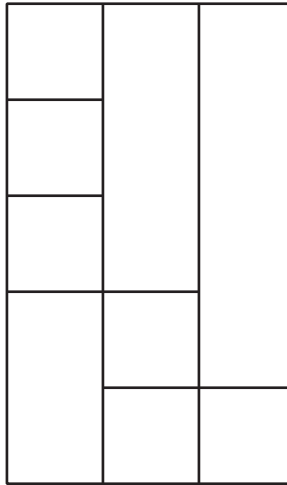
- a. 20
- b. Sample responses:  $5 + 5 + 5 + 5 = 20$  and  $4 + 4 + 4 + 4 + 4 = 20$

### Problem 2

#### Goals Assessed

- Partition rectangles into rows and columns of equal-size squares, and count to find the total number of squares.
- Represent the total number of objects in an array as a sum of equal addends.

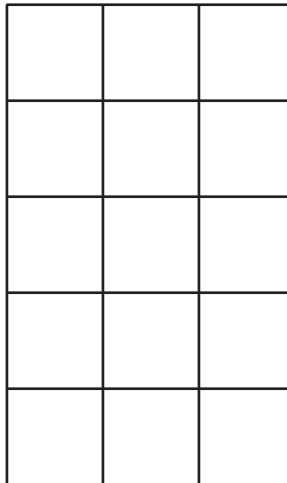
a. Draw lines so that the rectangle is completely filled with equal-size squares.



- b. Write an equation to represent the total number of equal-size squares.

### Solution

- a. Sample response:



- b. Sample responses:  $3 + 3 + 3 + 3 + 3 = 15$  or  $5 + 5 + 5 = 15$

## Assessment: End-of-Unit-Assessment

### Problem 1

#### Standards Alignments

Addressing 2.OA.C.3

#### Narrative

Students are given a situation where they do not know the number of objects and need to decide whether they can conclude that certain quantities are odd or even. They only know that Han has the same number of pencils as Priya but do not know how many pencils Han and Priya each have. When they put their pencils together, it is an even number because each of Han's pencils can be paired with one of Priya's pencils. Response A could also be true as Han could have 4 pencils. It is also possible that Priya could have, for example, 5 pencils so response B could be true. Students who choose response D or fail to choose response E are likely not thinking about the given information that Han and Priya have the same number of pencils. Students who select C have probably not read the question carefully.

Han and Priya each have some pencils. Han has the same number of pencils as Priya. Select **3** statements which could be true.

- A. Han has an odd number of pencils.
- B. Priya has an even number of pencils.
- C. Han has an odd number of pencils and Priya has an even number of pencils.
- D. Han and Priya together have an odd number of pencils.
- E. Han and Priya together have an even number of pencils.

### Solution

["A", "B", "E"]

## Problem 2

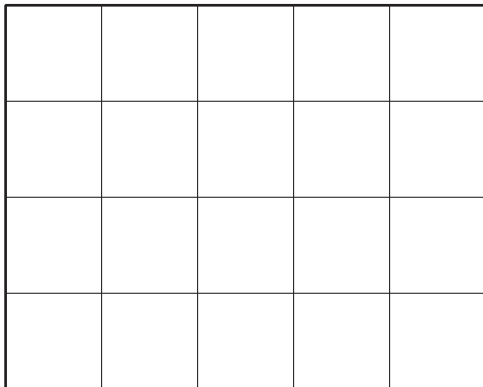
**Standards Alignments**

Addressing 2.OA.C.3, 2.OA.C.4

**Narrative**

Students select expressions that represent the number of squares in an array and they also decide whether there are an even number or odd number of squares in the array. Students who select B and C instead of A and D may be counting the columns and rows incorrectly or confusing the number of squares in the rows and columns with the number of rows and columns. Students who select E instead of D may be noticing that there are an odd number of squares in each row or they may have tried to pair up the squares and not been careful and precise.

Mai split the rectangle into equal-size squares. Select **3** correct statements about the diagram.



- A. The total number of equal-size squares is  $5 + 5 + 5 + 5$ .
- B. The total number of equal-size squares is  $4 + 4 + 4 + 4$ .
- C. The total number of equal-size squares is  $5 + 5 + 5 + 5 + 5$ .
- D. The total number of equal-size squares is  $4 + 4 + 4 + 4 + 4$ .
- E. The total number of equal-size squares in the array is even.
- F. The total number of equal-size squares in the array is odd.

**Solution**

["A", "D", "E"]

## Problem 3

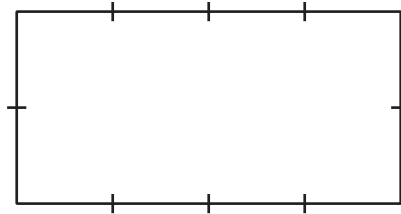
**Standards Alignments**

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

**Narrative**

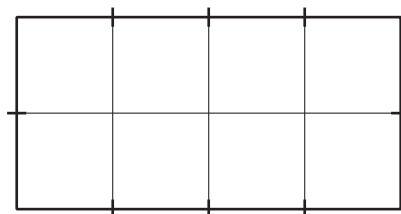
Students divide a rectangle into equal rows and columns with the scaffold of regularly spaced tick marks on the side of the rectangle. Then they find the number of squares the rectangle is divided into. A student could subdivide the rectangle further into even smaller squares. This would then influence their answer to the second question.

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



- b. How many equal-size squares are there?

## Solution



- a.  
b. 8

## Problem 4

**Standards Alignments**

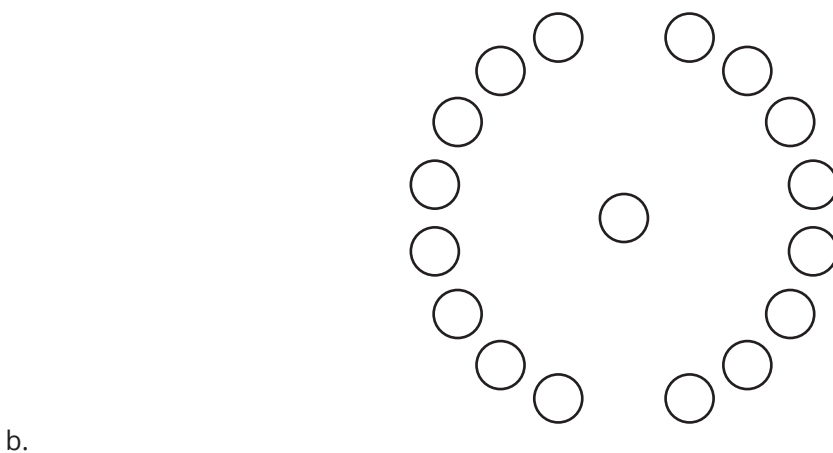
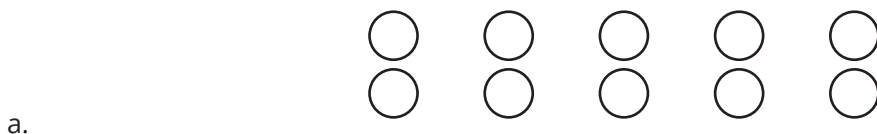
Addressing 2.OA.C.3

**Narrative**

Students identify whether there are an even or an odd number of circles in an image. They can do

this in several ways including making pairs, counting them, or looking for structure. In each case, there is a structural way to see whether or not the circles can all be matched with a partner.

For each image, determine whether there are an even or odd number of circles. Explain your reasoning.



### Solution

- Even, because each circle in the top row matches with a circle in the bottom row. The circles come in pairs.
- Odd, because each circle on the left has a partner on the right and then the circle in the middle is left over.

### Problem 5

#### Standards Alignments

Addressing 2.OA.C.3

#### Narrative

Students decide whether a number is even or odd. When the number is even, they write it as a sum of equal addends. While students may draw a picture in order to solve these problems, at the end of the unit they may also be able to just “see” whether the numbers are even or odd. Give students

access to connecting cubes or counters to help decide if the numbers are even or odd.

For each number, decide whether the number is even or odd. Write each even number as the sum of 2 equal addends.

- a. 6
- b. 11
- c. 14

### Solution

- a. even,  $6 = 3 + 3$
- b. odd
- c. even,  $14 = 7 + 7$

### Problem 6

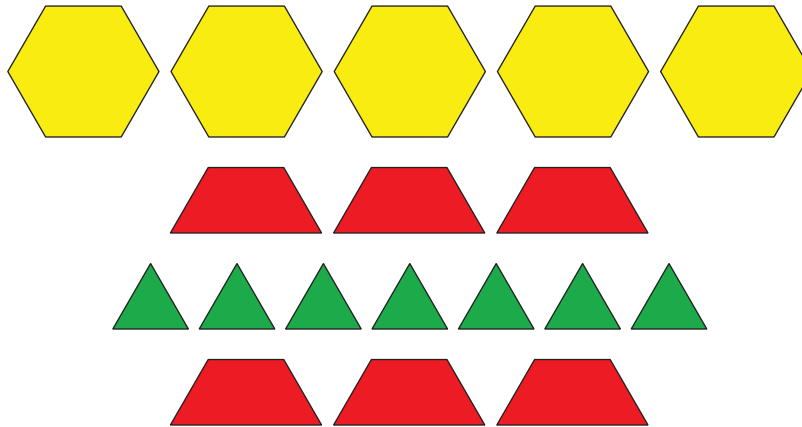
#### Standards Alignments

Addressing 2.OA.C.3

#### Narrative

Students decide if a collection of pattern blocks can be split into two identical groups. It is important for them to analyze each individual shape and make sure that there are an even number in each case. Some students may answer the final question incorrectly, giving Jada and Diego the same *number* of pattern blocks but different blocks.

Here are some pattern blocks that Jada and Diego want to share.



- Explain why there are an even number of trapezoids.
- Jada says that she and Diego can share the pattern blocks so they each have 9 pattern blocks. Explain why Jada is correct.
- Can Jada and Diego share all of the pattern blocks so that they each have the same set of pattern block shapes? Explain or show your reasoning.

### Solution

- There are 3 pairs of trapezoids.
- Jada can have all of the triangles and two trapezoids. That makes 9 shapes. Han can have 4 trapezoids and all of the hexagons. That makes 9 shapes too.
- No. Jada and Diego can each have 3 trapezoids. But there are an odd number of triangles and an odd number of hexagons so they can not have the same number of triangles and hexagons. They can each have 3 triangles and 2 hexagons but there is one triangle and one hexagon left over.

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Lesson  
Cool Downs

# Lesson 1: Can You Share?

## Cool Down: Share with Your Partner

Noah and Lin want to share 11 connecting cubes equally. How many will each student get? Will there be any leftovers?

Show your thinking using diagrams, symbols, or other representations. You may use cubes if it helps.

## **Lesson 2: Partners Make Pairs**

### **Cool Down: Everybody Find a Partner**

Nine students need to pair up to play a game. Will everyone have one partner?

Show your thinking using a diagram, symbols, or other representations.

# Lesson 3: Is it Odd or Even?

## Cool Down: Even or Odd?

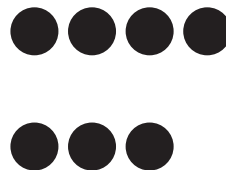
1. Is the total number of balloons even or odd? Explain how you know.



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2. Is the number of dots even or odd? Explain how you know.



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# Lesson 4: Decompose Even and Odd Numbers

## Cool Down: Two Equal Addends

Decide whether the number of dots is even or odd. Circle your choice.

Write an equation with two equal addends for each image if you can.

1. even or odd



$$\underline{\quad} = \underline{\quad} + \underline{\quad}$$

2. even or odd



$$\underline{\quad} = \underline{\quad} + \underline{\quad}$$

# Lesson 5: Patterns with Even and Odd Numbers

## Cool Down: Odd One Out

1. Elena has 8 counters. Does she have an even or odd number of counters? Explain or show your reasoning.

2. Without adding, explain which one of these expressions represents an odd number.

A

$4 + 4$

B

$8 + 1$

C

$8 + 2$

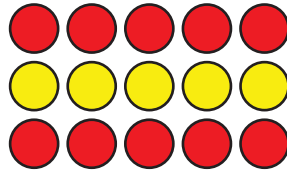
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# Lesson 7: What is an Array?

## Cool Down: Count the Counters



1. How many rows are in this array?
2. How many counters are in each row?
3. How many counters are there in all?

# Lesson 8: Count Columns and Objects in Columns

## Cool Down: Make Rows and Columns

1. Show an array with 4 rows and 2 objects in each row.

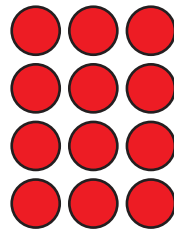
2. How many columns are there? How many objects are in each column?

3. How many objects are there in all?

# Lesson 9: A Sum of Equal Addends

## Cool Down: Match Expressions with Arrays

1. Circle the 2 expressions that represent the rows and columns of the array.



$4 + 4 + 4$

$4 + 4 + 4 + 4$

$3 + 3 + 3$

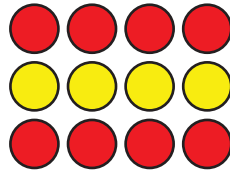
$3 + 3 + 3 + 3$

2. How many counters are there in all?

# Lesson 10: Write Expressions and Equations to Represent Arrays

## Cool Down: 1 Array, 2 Equations

Write 2 equations that represent the array and show the number in each row or each column.



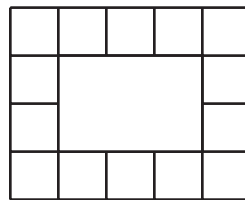
$$\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}$$

# Lesson 11: Arrays and Rectangles

## Cool Down: Partition Rectangles into Squares

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



2. Write 2 equations to represent the number of equal-size squares in the rectangle.

# Lesson 12: Partition Rectangles into Squares

## Cool Down: How Many Squares?

1. Partition the rectangle into equal-size squares.



2. How many rows of equal-size squares did you make?

3. How many columns of equal-size squares did you make?

4. Write an equation that represents the number of squares in the rectangle.

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Instructional  
Masters

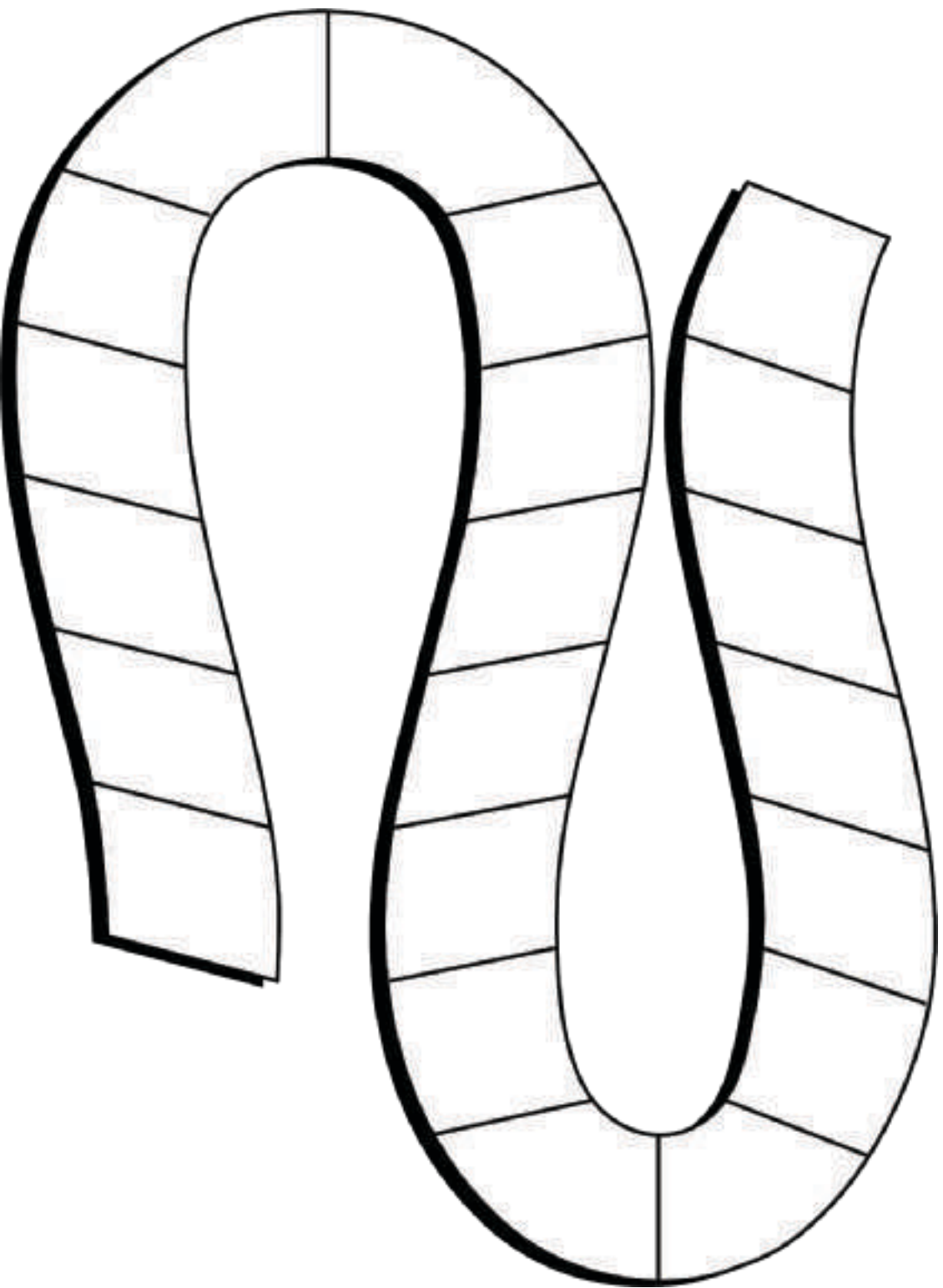
# Instructional Masters for Equal Groups

address	title	students written per copy	on?	requires cutting?	card stock recommended?	color paper recommended?
Activity Grade2.8.6.1	Write the Number Stage 4 Gameboard	2	no	no	no	no
Center	Write the Number Stage 4 Gameboard	2	no	no	no	no
Activity Grade2.8.5.2	Presto Chango Recording Sheet	1	yes	no	no	no
Activity Grade2.8.9.2	Match Arrays to Expressions Card Sort	2	no	yes	no	no
Activity Grade2.8.3.2	Even and Odd Card Sort	1	no	yes	no	no
Center	Target Numbers Stage 7 Recording Sheet	1	yes	no	no	no
Center	Five in a Row Addition and Subtraction Stage 8 Gameboard	2	no	no	no	no
Center	How Close? Stage 4 Recording Sheet	1	yes	no	no	no
Center	Number Cards (0-10)	2	no	yes	yes	no
Center	Target Numbers Stage 6 Recording Sheet	1	yes	no	no	no
Center	Five in a Row Addition and Subtraction Stage 7 Gameboard	2	no	no	no	no

## Write the Number Stage 4 Gameboard

### Directions:

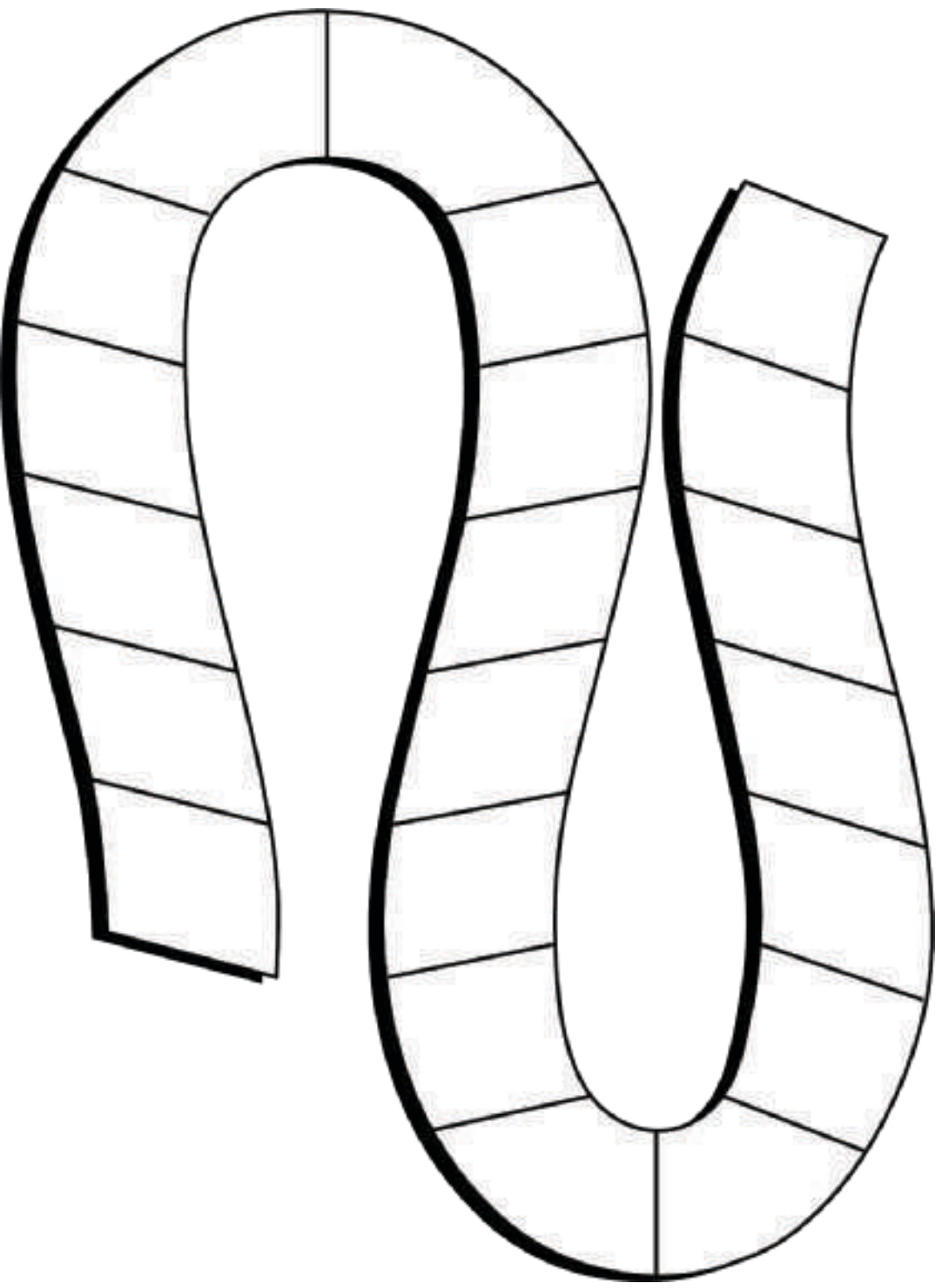
- Partner A: Choose whether to start with 2, 5, or 10. You will skip count by that number. Write the next 1, 2, or 3 numbers on the gameboard.
- Take turns choosing how many numbers to write and then writing them. The player who writes the last number on the gameboard wins



## Write the Number Stage 4 Gameboard

### Directions:

- Partner A: Choose whether to start with 2, 5, or 10. You will skip count by that number. Write the next 1, 2, or 3 numbers on the gameboard.
- Take turns choosing how many numbers to write and then writing them. The player who writes the last number on the gameboard wins



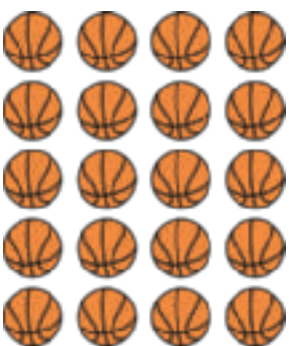
# Presto Chango Recording Sheet

Use diagrams, symbols, or other representations to show your thinking.

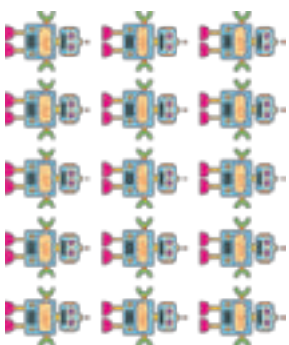
	add 1 counter	add 2 counters
<b>Diego has 4 counters.</b>	even or odd	even or odd
<b>Clare has 7 counters.</b>	even or odd	even or odd
<b>Mai has 13 counters.</b>	even or odd	even or odd
<b>Jada has 16 counters.</b>	even or odd	even or odd

Match Arrays to Expressions Card Sort

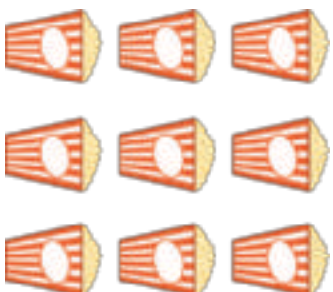
Match Arrays to Expressions  
Card A



Match Arrays to Expressions  
Card B



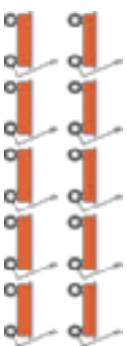
Match Arrays to Expressions  
Card C



Match Arrays to Expressions  
Card D



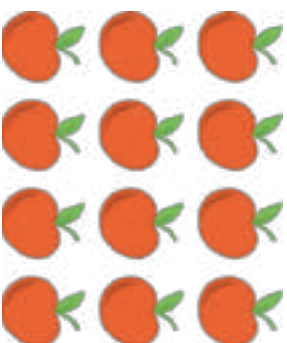
Match Arrays to Expressions  
Card E



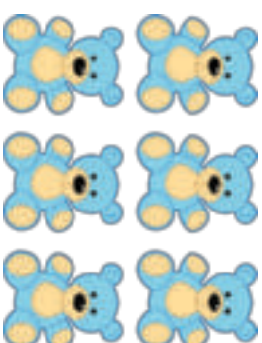
Match Arrays to Expressions  
Card F



Match Arrays to Expressions  
Card G



Match Arrays to Expressions  
Card H



# Match Arrays to Expressions Card Sort

Match Arrays to Expressions  
Card I

$$5 + 5$$

Match Arrays to Expressions  
Card J

$$3 + 3$$

Match Arrays to Expressions  
Card K

$$2 + 2 + 2 + 2$$

Match Arrays to Expressions  
Card L

$$4 + 4 + 4 + 4 + 4$$

Match Arrays to Expressions  
Card M

$$4 + 4$$

Match Arrays to Expressions  
Card N

$$5 + 5 + 5$$

Match Arrays to Expressions  
Card O

$$3 + 3 + 3$$

Match Arrays to Expressions  
Card P

$$5 + 5 + 5 + 5$$

# Match Arrays to Expressions Card Sort

Match Arrays to Expressions  
Card Q

$$3 + 3 + 3 + 3 + 3$$

Match Arrays to Expressions  
Card R

$$4 + 4 + 4 + 4 + 4$$

Match Arrays to Expressions  
Card S

$$5 + 5 + 5 + 5$$

Match Arrays to Expressions  
Card T

$$2 + 2 + 2 + 2 + 2$$

Match Arrays to Expressions  
Card U

$$4 + 4 + 4$$

Match Arrays to Expressions  
Card V

$$2 + 2 + 2$$

Match Arrays to Expressions  
Card W

$$3 + 3 + 3 + 3$$

Match Arrays to Expressions  
Card X

$$20$$

# Match Arrays to Expressions Card Sort

Match Arrays to Expressions  
**Card Y**

8

Match Arrays to Expressions  
**Card Z**

20

Match Arrays to Expressions  
**Card AA**

6

Match Arrays to Expressions  
**Card BB**

15

Match Arrays to Expressions  
**Card CC**

12

Match Arrays to Expressions  
**Card DD**

9

Match Arrays to Expressions  
**Card EE**

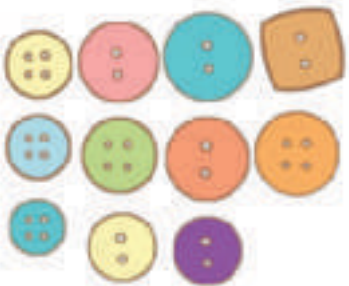
10

# Even and Odd Card Sort

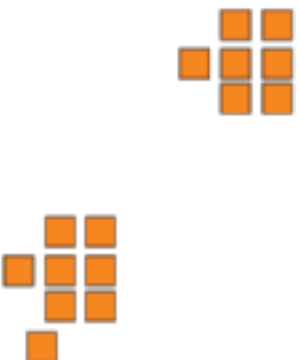
A Even and Odd Card Sort



B Even and Odd Card Sort



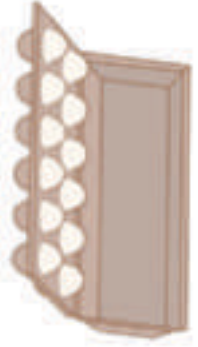
C Even and Odd Card Sort



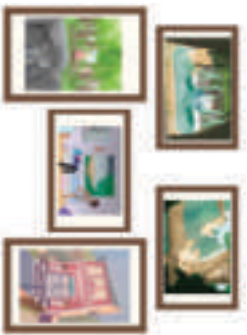
D Even and Odd Card Sort



E Even and Odd Card Sort



F Even and Odd Card Sort



G Even and Odd Card Sort



H Even and Odd Card Sort



# Even and Odd Card Sort

I  
Even and Odd Card Sort



M  
Even and Odd Card Sort

$$8 = 4 + 4$$

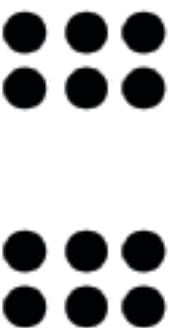
J  
Even and Odd Card Sort



N  
Even and Odd Card Sort

$$5 + 5 + 1 = 11$$

K  
Even and Odd Card Sort



O  
Even and Odd Card Sort

$$6 + 6 = 12$$

L  
Even and Odd Card Sort



P  
Even and Odd Card Sort

$$8 + 8 = 16$$



# Five in a Row Addition and Subtraction Stage 8 Gameboard

Directions:

- Partner A: Put a paper clip on 2 numbers in the grey rows. Cover the sum of the 2 numbers with a counter.
- Partner B: Move 1 of the paper clips, add the numbers, and cover the sum with a counter.
- Take turns. The first partner to cover 5 squares in a row wins.



918	935	335	401	313
446	407	585	929	709
352	613	440	591	754
715	748	630	896	429
346	890	737	307	624

45	67	78	84	39
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670	362	851	546	268
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How Close? Stage 4 Recording Sheet


+

---

Your score this round: \_\_\_\_\_


+

---

Your score this round: \_\_\_\_\_


+

---

Your score this round: \_\_\_\_\_

Number Cards (0-10)

1

2

3

4

5

6

Number Cards (0-10)

7

8

9

1

2

3

Number Cards (0-10)

4

5

6

7

8

9

Number Cards (0-10)

0

0

10

10

# Target Numbers Stage 6 Recording Sheet

## Directions:

- Roll 3 number cubes to get a starting number for both partners.
- On your turn:
  - Roll 3 number cubes. For each cube, decide whether it represents hundreds, tens or ones that you will add to your starting number.
  - Write an equation to represent the sum.
- Take turns until you've played 6 rounds.
- Each round, the sum from the previous equation is the starting number in the new equation.
- The partner to get a sum closest to 1,000 without going over wins.

roll and choose	equation
____ hundreds ____ tens ____ ones	$\begin{array}{ccc} & + & = \\ \text{_____} & & \text{_____} \end{array}$
____ hundreds ____ tens ____ ones	$\begin{array}{ccc} & + & = \\ \text{_____} & & \text{_____} \end{array}$
____ hundreds ____ tens ____ ones	$\begin{array}{ccc} & + & = \\ \text{_____} & & \text{_____} \end{array}$
____ hundreds ____ tens ____ ones	$\begin{array}{ccc} & + & = \\ \text{_____} & & \text{_____} \end{array}$
____ hundreds ____ tens ____ ones	$\begin{array}{ccc} & + & = \\ \text{_____} & & \text{_____} \end{array}$
____ hundreds ____ tens ____ ones	$\begin{array}{ccc} & + & = \\ \text{_____} & & \text{_____} \end{array}$

## Five in a Row Addition and Subtraction Stage 7 Gameboard

Directions:

- Partner A: Put a paper clip on 2 numbers in the grey rows. Cover the sum of the 2 numbers with a counter.
- Partner B: Move 1 of the paper clips, add the numbers, and cover the sum with a counter.
- Take turns. The first partner to cover 5 squares in a row wins.



704	669	621	442	784
497	695	323	956	44
586	413	784	576	614
297	386	378	867	532
873	99	134	531	665

263	100	352	65	10
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34	432	604	313	521
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**Adding, Subtracting, and Working with Data**  
**Adding and Subtracting within 100**  
**Measuring Length**  
**Addition and Subtraction on the Number Line**  
**Numbers to 1,000**  
**Geometry, Time, and Money**  
**Adding and Subtracting within 1,000**  
**Equal Groups**  
**Putting it All Together**

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