

Use Arrays to Find Totals

FOCUS

Mathematics Objective Find the total number of objects in a set of rows and columns.

Language Objective Describe different arrays by reading the terms *rows* and *columns* and writing addition equations to match the rows and columns in the array.

Essential Understanding An array shows equal groups, so you can write equations using repeated addition to find the total number of objects in an array.

COHERENCE

Look Back Previously in this topic, students wrote equations to represent even numbers.

This Lesson Students learn to use repeated addition and write equations to find the total number of objects in an array. In the process, students learn to connect the parts of the equation to the array model.

Look Ahead Later, students will use arrays when they learn multiplication facts.

Additional Connection Adding to find the number of objects in rectangular arrays uses addition within 20.

RIGOR

Conceptual Understanding As students work with arrays, they develop a conceptual understanding of repeated addition, which builds a foundation for multiplication.

Procedural Skill Students develop the skill of writing equations to represent arrays, and they practice adding.

Vocabulary

- array
- rows
- columns

Materials

- Counters (or Teaching Tool 77)

Student Resources

 Family Engagement

Intervention System (IS)

A90 Arrays and Repeated Addition

Teacher Resources

Available at
Savvas Realize®.

 Editable Lesson Plan

 Lesson Presentation Slides

 enVision on the Go: Planning Support



Notes

Language Support

Conversation Prompts Use this activity with the Explore and Share to help students explain their thinking or strategy after they find the total number of circles.

Provide prompts to help students form their explanations such as the following.

"How are circles in the model organized?"

"How does the organization of circles help you find the solution?"

"How did you find the total number of circles?"

"Are there different ways to view the circles?"

"Are there other ways to find the total number of circles?"

An additional activity is available online.

- Use this activity about connecting representations with the Visual Learning.

Math Talk

Quick Look

What is $2 + 3$?
Describe what you saw.



Answer:
5

Number Sense Show students the image for about 5 seconds and ask them to describe what they saw. Ask: **What is $2 + 3$?** Have students write their answers or talk in pairs. Then discuss their responses and show them the image again.

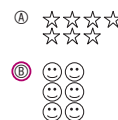
Exit Ticket

Formative Assessment

Lesson 2-3
Exit Ticket

Name _____

1. Which group is an array?



2. Which equation matches the array?



Ⓐ $3 + 3 = 6$

Ⓒ $2 + 2 + 2 = 8$

Ⓑ $2 + 2 + 2 = 6$

Ⓓ $3 + 3 + 3 = 9$

3. Ross sets lemons in an array. He has 3 rows of lemons with 6 lemons in each row. Which equation shows how many lemons in all?

Ⓐ $3 + 3 = 6$

Ⓒ $3 + 3 + 3 = 9$

Ⓑ $6 + 6 = 12$

Ⓓ $6 + 6 + 6 = 18$

Have you met the lesson goals?

Math Goal
I can find the total number of objects in a set of rows and columns.



Teacher Answer Key

Assessment 1 of 1

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Auto-scored version online.

Use the Exit Ticket results to support students as needed by reminding them that the total number of objects in an array can be written as an equation using repeated addition.



By Rows: $2 + 2 + 2 = 6$

By Columns: $3 + 3 = 6$

English Language Development

ELL English Language Learners (Visual Learning)

ELL English Language Learners (Practice and Problem Solving)

MLR3 Critique, Correct, and Clarify (Visual Learning)

Language Support (Explore and Share)

Step 1 Explore and Share



10-15 min

Explore and Share

Scout Observational Assessment

ETP Explore and Share

Formative Assessment

Purpose Investigate different ways to find the total number of objects in a set of rows and columns.

Materials Counters (or Teaching Tool 77)

Introduce **WHOLE CLASS**

Ask: How can you neatly organize a pile of shoes?

Monitor, Select, and Sequence **SMALL GROUP**

Observe students at work.

- **How do students find the total number?** They might count each circle individually or use the rows and columns to help them find the total.

Look for solutions that describe how they counted. If students find the total by counting the circles individually, ask: *How could you group the circles to count more quickly?*

Select solutions for students to present. Show solutions that use rows and columns to find the total number of circles (Maria) before solutions that count circles individually (Jim).

Distribute counters (or Teaching Tool 77) as needed for students who may need additional practice and support throughout the lesson.

Early Finishers

Ask: *Can you show and explain a third way to find how many circles in all?* [Sample answer: Make groups of 10 and then count how many remain. There is 1 group of 10 and 5 more, so there are 15 circles.]

Connect **WHOLE CLASS**

Connect Solution Strategies Discuss students' work. Both Maria and Jim found how many circles in all using two different ways. Maria understood how to find the total using the rows and columns, but Jim did not use the equal columns to find the total.

Connect to the Visual Learning During the Visual Learning, connect to student work in Explore and Share. Be sure students understand that they can use either the rows or the columns to find the total number of objects in an array.

Name _____

Use Arrays to Find Totals

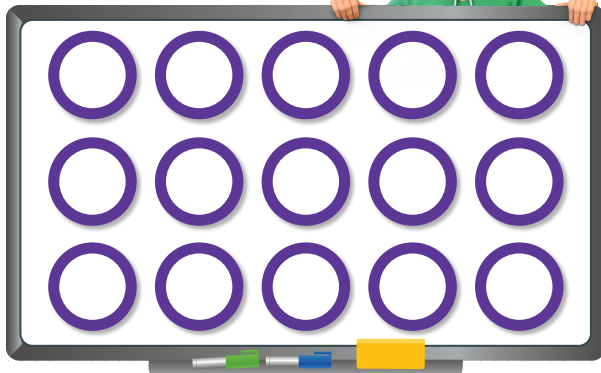
I can ... find the total number of objects in a set of rows and columns.

Let's Build

Lesson
2-3

Explore and Share

Show and explain two different ways to find how many circles in all.

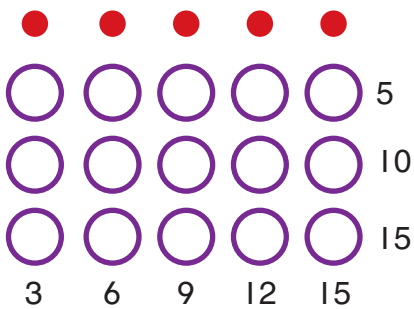


See margin for sample student work.

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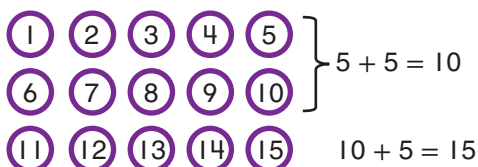
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Sample Student Work



Maria's Work

Maria counted different groups of circles. She counted by 5s to find the total: 5, 10, 15. She also counted by 3s to find the total: 3, 6, 9, 12, 15.



Jim's Work

Jim counted the circles one by one to find that the total is 15. He also added groups of 5 to find the total. He said $5 + 5 = 10$ and $10 + 5 = 15$.

Visual Learning Animation

Visual Learning

A

You can model repeated addition with an **array**.

B

Arrays have equal **rows**.
Each row has 3 strawberries.

C

Arrays have equal **columns**.
Each column has 2 strawberries.

D

Write two equations that match the array.

By Rows
 $3 + 3 = 6$

By Columns
 $2 + 2 + 2 = 6$

Talk About Math Ideas

Is this group an array? Explain.

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ELL English Language Learners Reading

Read Box A. Say: Arrays have items arranged in rows and columns. Point to the array in Box B. Say: This is an array. Point to a row. Say: The strawberries are in rows. Point to the array in Box C. Point to a column. Say: The strawberries are in columns.

Emerging Read Box D. Ask students to point to the array that $3 + 3 = 6$ represents, and then the array that $2 + 2 + 2 = 6$ represents. Have students define an array using this sentence stem: "An array has equal/unequal rows and equal/unequal columns."

Expanding Have students work in pairs. Read Box D and ask students to identify arrays represented by $3 + 3 = 6$ and $2 + 2 + 2 = 6$. They should explain to their partner how they identified each array. Then have students define an array using this sentence stem: "An array has equal/unequal rows and equal/unequal columns."

Bridging Have students work in pairs. Read Box D. Ask students to identify arrays represented by $3 + 3 = 6$ and $2 + 2 + 2 = 6$. Ask students to explain how the equations were written using information from the array.

ETP Visual Learning

Essential Question Ask: What are two ways you can use addition to find the total number of objects in an array?

Classroom Conversation

A How many strawberries are in each row? [3] How many strawberries are in each column? [2] Is this an array? [Yes]

B Construct Arguments How many strawberries are there in all? [6] How do you know? [Sample answer: There are 3 berries in each row, and there are 2 rows, so I can add 3 plus 3, which equals 6.]

C How can you add the number of berries in each column to find the total number of berries? [Sample answer: Since there are 2 berries in each column and there are 3 columns, I can add 2 plus 2 plus 2.] How many strawberries are there in all? [6]

D Model with Math Which equation shows adding the berries in each row to find the total? [$3 + 3 = 6$] Which equation shows adding the berries in each column to find the total? [$2 + 2 + 2 = 6$] What do you notice about the two equations? [They have the same sum.]

Prevent Misconceptions Watch for students who lose their place while counting the identical items in a row. Students can circle the rows as they count.

MLR3 Critique, Correct, and Clarify

Draw an incomplete array of squares on the board such as 2 rows of 3 squares and 1 row of 2 squares.

Ask: How can you correct the drawing to make it an array? [Sample answer: Drawing 1 more square to make equal rows and equal columns will make it an array.]

ETP Talk About Math Ideas

Have students engage in a think-pair-share to discuss their reasoning on whether the group of oranges is an array. Listen for conversations about needing equal rows and equal columns for a group to be an array.

ETP Revisit the Essential Question

Students should explain that they can count the number of rows (or columns) and then add the number of objects in each row (or column) that many times.

Step 3 Practice and Problem Solving



15-20 min

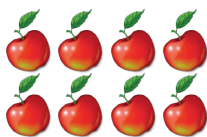
Interactive Practice

Name _____

Guided Practice

Write two equations that match each array.

1.



By Rows

$$4 + 4 = 8$$

By Columns

$$2 + 2 + 2 + 2 = 8$$

2.



By Rows

$$3 + 3 + 3 = 9$$

By Columns

$$3 + 3 + 3 = 9$$

Practice and Problem Solving

Write two equations that match each array.

3.



By Rows

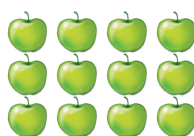
$$5 + 5 = 10$$

By Columns

$$2 + 2 + 2 + 2 + 2 = 10$$



4.



By Rows

$$4 + 4 + 4 = 12$$

By Columns

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



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You may opt to have students complete automatically scored practice items online.

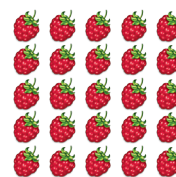
Solve each problem.

5. **Look for Patterns** Ross picks raspberries from a tree. He gives the same number of raspberries to 5 friends. Write an equation to match the picture. How many raspberries did Ross pick?

$$5 + 5 + 5 + 5 + 5 = 25$$

25 raspberries

Look at the raspberries in each group.



6. **Higher Order Thinking** Draw a garden with up to 5 rows and that has the same number of flowers in each row. Then write two equations that match your array.

Check students' work.

Assessment Practice



7. Blake sets basketballs in an array. He has 4 rows of basketballs with 3 basketballs in each row. Which equation shows the array Blake made and how many basketballs in all?

(A) $3 + 3 + 3 + 3 = 12$

(C) $3 + 3 = 6$

(B) $4 + 4 = 8$

(D) $3 + 3 + 3 = 9$

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Guided Practice



Error Intervention Item 2

If students lose their place while counting the identical items in a row,

then prompt them to circle the rows as they count. Point out to students that this is a special case, in which the number of columns and rows is equal.

Items 1-2 Students need to analyze the relationship between the array and the two equations that they write to represent the same array. Remind students that arrays can be represented in rows or in columns. Students may find it easier to solve the problem if they use counters to make the array. Check to see if they build the array correctly.

Practice and Problem Solving

ELL English Language Learners

Item 3 Students may need support to remember which are rows and which are columns in arrays. Make sure students understand the terms *rows* and *columns* before they write equations. Rows go across. How many items are in each row? [5] Columns go up and down. How many items are in each column? [2]

ETP Quick Check



Check marks indicate items for prescribing differentiation. Items 4 and 7: 1 point each. Item 5: up to 3 points. The online Quick Check is auto scored and auto prescribes differentiation.



Differentiation Library **DL**

The **Differentiation Library** at the beginning of this topic shows the differentiation options available, each of which can be appropriate for all students. However, based on the **Quick Check** results, you may prescribe:

0-3 points: Intervention Activity or Reteach to Build Understanding Activity

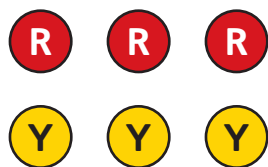
4-5 points: Enrichment Activity

In addition, **English language learners** may benefit from the Build Mathematical Literacy Activity.

Intervention Activity

Materials Two-color counters (or Teaching Tool 77), 10 per pair

- Arrange students in pairs. Give each pair six counters and ask them to make an array using their counters.
- Ask one partner to name the number of rows. Ask the other partner to name the number of counters in each row. Have partners work together to write an equation to show the total number of counters in the array, by rows.
- Ask one partner to name the number of columns. Ask the other partner to name the number of counters in each column. Have partners work together to write an equation to show the total number of counters in the array, by columns.



2 rows

3 counters in each row

$$3 + 3 = 6$$

3 columns

2 counters in each column

$$2 + 2 + 2 = 6$$

- Repeat, using a different number of counters.

Video Tutorial Available at Savvas Realize®

Students can access this video anytime to reinforce lesson content.

Another Look Video

Additional Practice

Printable or autoscored at Savvas Realize®

Name _____

Use Arrays to Find Totals

HOME ACTIVITY Gather 12 small objects. Have your child make an array with 4 rows. Then have him or her make an array with 2 columns. Have your child write an equation that matches each array.

Additional Practice **2-3**

Another Look!

You can use an array to show equal groups.

There are 3 rows. There are 3 circles in each row.

There are 3 columns. There are 3 circles in each column.

$3 + 3 + 3 = 9$ $3 + 3 + 3 = 9$

You can add the objects in an array by rows or columns!

Write two equations that match each array.

1. By Rows $3 + 3 = 6$ By Columns $2 + 2 + 2 = 6$

2. By Rows $4 + 4 + 4 = 12$ By Columns $3 + 3 + 3 + 3 = 12$

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Solve each problem.

Model Write two equations that match each array and tell the total number of objects.

3. By Rows $4 + 4 = 8$ By Columns $2 + 2 + 2 + 2 = 8$

4. By Rows $5 + 5 = 10$ By Columns $2 + 2 + 2 + 2 + 2 = 10$

5. **Higher Order Thinking** There are 16 flowers in a garden. Draw a garden with up to 4 columns that have the same number of flowers in each column. Then write two equations that match your array.
Check students' work.

6. **Assessment Practice** Gail puts her crayons in 3 rows. 5 crayons are in each row. Which equation shows the array Gail makes and how many crayons there are in all?

☒ A $5 + 5 + 5 = 15$ ☐ C $3 + 3 + 3 = 9$
☐ B $5 + 5 = 10$ ☐ D $3 + 3 = 6$

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