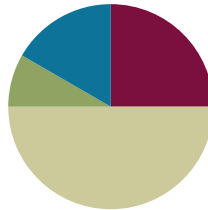


## Lesson 4

**Objective:** Understand the meaning of the unknown as the size of the group in division.

### Suggested Lesson Structure

■ Fluency Practice	(15 minutes)
■ Application Problem	(5 minutes)
■ Concept Development	(30 minutes)
■ Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (15 minutes)

- Repeated Addition as Multiplication **3.OA.1** (10 minutes)
- Group Counting **3.OA.1** (3 minutes)
- Array Multiplication **3.OA.1** (2 minutes)

### Sprint: Repeated Addition as Multiplication (10 minutes)

Materials: (S) Repeated Addition as Multiplication Sprint

Note: Students relate repeated addition to multiplication. This reviews Topic A's objectives. See *Directions for Administration of Sprints* in Lesson 2.

### Group Counting (3 minutes)

Note: Group counting reviews interpreting multiplication as repeated addition. Counting by twos and threes in this activity anticipates work with those factors in this lesson.

- T: Let's count by twos. (Direct students to count forward and backward to 20, periodically changing directions, e.g., 2, 4, 6, 8, 10, 8, 10, 12, 10, 12, 14, 16, 18, 20, 18, 20, 18, 16, 14, 12, 10, 12, 10, 8, 10, 8, 6, 4, 2, 0.)
- T: Let's count by threes. (Direct students to count forward and backward to 24, periodically changing directions. Emphasize the 9 to 12 and 18 to 21 transitions, e.g., 3, 6, 9, 12, 9, 12, 9, 12, 15, 18, 21, 18, 21, 18, 21, 24, 21, 18, 21, 18, 15, 12, 15, 12, 9, 12, 9, 6, 3, 0.)

**Array Multiplication (2 minutes)**

Materials: (S) Personal white boards.

Note: This activity reviews Topic A’s objectives. Students directly relate repeated addition to multiplication. They interpret products using the array.

- T: (Project a picture array with 3 groups of 2 circled.) Say the repeated addition sentence.
- S:  $2 + 2 + 2 = 6$ .
- T: (Write  $3 \times \underline{\quad} = \underline{\quad}$ .) On your personal boards, complete the multiplication sentence.
- S: (Write  $3 \times 2 = 6$ .)

Continue with possible sequence: 4 groups of 10, 3 groups of 4, 7 groups of 3, and 8 groups of 2.

**Application Problem (5 minutes)**

The student council holds a meeting in Mr. Chang’s classroom. They arrange the chairs in 3 rows of 5. How many chairs are used in all? Use the RDW process.

Note: This problem reviews relating multiplication to the array model from Lesson 2. Students may choose to solve by drawing an array (Lesson 2) or a number bond (Lesson 3) where each part represents the amount of chairs in each row.

**Concept Development (30 minutes)**

Materials: (S) Personal boards, 18 counters per student

**Concrete to abstract: Division as fair share, relate the answer to the unknown factor.**

**MP.2**

- T: Yesterday our neighbor Mr. Ziegler bought a new pack of 18 markers. He wanted to share them with me, so he divided them into 2 equal groups. Now I have a bunch of new markers for making our charts! Do you want to know how many he gave me?
- S: Yes.
- T: What are we trying to find, the number of groups or the size of the group?
- S: The size of the group.
- T: Your 18 counters represent the markers. Divide your 18 counters into 2 equal groups, by giving one to Mr. Z,



**NOTES ON MULTIPLE MEANS FOR ACTION AND EXPRESSION:**

This may be students’ first time independently dividing in a formal context. Life experience has likely taught them the fair-share strategy of going back and forth to give 1 and 1, 2 and 2, 3 and 3, etc., until there are no more to distribute. Encourage those who are unsure what to do, or who are using a less efficient strategy toward fair-share.

one to me, one to Mr. Z, one to me (model the partitioning.)

S: (Divide using the fair-share strategy.)

T: Using a complete sentence, tell how many counters are in each group.

S: There are 9 counters in each group.

T: Then how many markers did Mr. Ziegler give me?

S: 9 markers!

T: Let's write a number sentence to show our work, starting from the beginning. What is our total number of counters?

S: 18 counters.

T: (Write 18 on the board.) We divided our 18 counters into how many equal groups?

S: We divided into 2 equal groups.

T: (Write  $\div 2 = \underline{\quad}$  on the board next to the 18.)

T: If 18 is our total and 2 represents our equal groups, then remind me, what does our **unknown** factor represent? (Point to where the answer will go.)

S: The size of the groups.

T: That is?

S: 9.

T: 18 divided by 2 equals 9. (Finish writing as you read  $18 \div 2 = 9$ .)

T: This equation shows how Mr. Ziegler gave me...

S: 9 markers!

MP.2

Repeat the process with  $15 \div 3 = \underline{\quad}$ . "Suppose Mr. Z had 15 markers and shared fairly with 2 teachers?" This time, also review that  $\div$  means to divide.

T: In what ways does dividing remind you of our work with multiplication?

S: It's also about the size of groups and the number of groups, but we used a different symbol.  $\rightarrow$  It still uses factors and a total.  $\rightarrow$  This time the total is not the answer. It's the beginning!  $\rightarrow$  So the answer has to do with groups, not the total.

T: Right. We multiply when we want to find the total. Here, we divided when we knew the total and wanted to find the size of the groups.

**Pictorial to abstract:** Analyze a picture to write a division equation wherein the solution tells the size of the group.

T: (Project or draw the following image.) This is how Diana arranges her star stickers.



T: What does the 12 represent in the picture?

S: The total number of Diana's star stickers.

T: What does the 3 represent?

S: The number of equal groups.

T: What does the 4 represent?

S: The size of each group.

T: Write an equation to represent Diana's stickers where the answer represents the size of the group.

S: (Write  $12 \div 3 = 4$ .)

T: (Write  $12 \div 3 = 4$  and  $12 \div 4 = 3$  on the board, even if students have written the correct number sentence.) What is the difference between these **division** sentences?

S: In the first one the answer represents the size of each group. In the second one the answer represents the number of groups.

T: If we're writing a division sentence where the answer represents the size of the group, then which equation should we use?

S:  $12 \div 3 = 4$ .

**Abstract to pictorial:** Analyze equations for the meaning of the solution and represent the equation with a drawing.

Write  $8 \div 4 = \underline{\quad}$ .

T: If 8 is the total and 4 is the number of groups, then what does the unknown factor represent?

S: The size of the groups!

T: Draw a picture on your board to go with my division sentence. Use your picture to help you find the unknown factor, then write the complete equation.

S: (Draw various pictures that show  $8 \div 4$ , then write  $8 \div 4 = 2$ )

Repeat the process with  $10 \div 2$ . As you design examples, keep in mind that Lesson 5 introduces students to division where the unknown factor represents the number of groups.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Understand the meaning of the unknown as the size of the group in division.

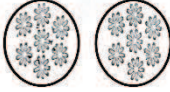

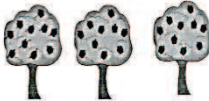

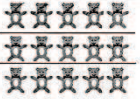

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson. You may choose to use any combination of the ideas below to lead the discussion.

- Ask students to share their number sentences for Problem 9. Because of the way the question is worded, answers will likely include  $15 \div 5 = 3$  (answer is the size of the group) and  $15 \div 3 = 5$  (answer is the number of groups). This presents an opportunity to begin a discussion in which students compare the equations by analyzing the meaning of the factors.
- Guide students to articulate the similarities and differences between multiplication and **division**, so that they are clear that division is used to find totals: total number of groups or objects in a group. This can also be thought of as a known factor and an **unknown** factor.
- Review phrases that include new vocabulary, such as *unknown factor* and *divided by*.

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 4 X•X


Name: Gina Date: 9/4

<p>1. </p> <p>Divide 14 flowers into 2 equal groups. There are <u>7</u> flowers in each group.</p>	<p>2. </p> <p>Divide 28 books into 4 equal groups. There are <u>7</u> books in each group.</p>
<p>3. </p> <p>Divide 30 apples into <u>3</u> equal groups. There are <u>10</u> apples in each group.</p>	<p>4. </p> <p>Divide <u>12</u> cups into <u>2</u> equal groups. There are <u>6</u> cups in each group. <math>12 \div 2 = \underline{6}</math></p>
<p>5. </p> <p>There are <u>5</u> toys in each group. <math>15 \div 3 = \underline{5}</math></p>	<p>6. </p> <p><math>9 \div 3 = \underline{3}</math></p>

COMMON CORE Lesson #: Lesson Name EXACTLY G3-M3-TE-14 Worksheet Date: 2/20/13 engageNY X.X.1


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 4 X•X

3. Audrina has 24 colored pencils. She puts them in 4 equal groups. How many colored pencils are in each group?




There are 6 colored pencils in each group.  
 $24 \div 4 = \underline{6}$

4. Charlie picks 20 apples. He divides them equally between 5 baskets. Draw the apples in each basket.



There are 4 apples in each basket.  
 $20 \div 5 = \underline{4}$

5. Chelsea collects butterfly stickers. The picture shows how she placed them in her book. Write a division sentence to show how she equally grouped her stickers.



There are 3 butterflies in each row.  
 $15 \div 5 = \underline{3}$

COMMON CORE Lesson #: Lesson Name EXACTLY G3-M3-TE-14 Worksheet Date: 2/20/13 engageNY X.X.2

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

**A**

# Correct \_\_\_\_\_

Add or multiply.

1	$5 + 5 + 5 =$	23	$3 + 3 + 3 + 3 =$
2	$3 \times 5 =$	24	$4 \times 3 =$
3	$5 \times 3 =$	25	$3 \times 4 =$
4	$2 + 2 + 2 =$	26	$3 + 3 + 3 =$
5	$3 \times 2 =$	27	$3 \times 3 =$
6	$2 \times 3 =$	28	$3 + 3 + 3 + 3 + 3 =$
7	$5 + 5 =$	29	$5 \times 3 =$
8	$2 \times 5 =$	30	$3 \times 5 =$
9	$5 \times 2 =$	31	$7 + 7 =$
10	$2 + 2 + 2 + 2 =$	32	$2 \times 7 =$
11	$4 \times 2 =$	33	$7 \times 2 =$
12	$2 \times 4 =$	34	$9 + 9 =$
13	$2 + 2 + 2 + 2 + 2 =$	35	$2 \times 9 =$
14	$5 \times 2 =$	36	$9 \times 2 =$
15	$2 \times 5 =$	37	$6 + 6 =$
16	$3 + 3 =$	38	$6 \times 2 =$
17	$2 \times 3 =$	39	$2 \times 6 =$
18	$3 \times 2 =$	40	$8 + 8 =$
19	$5 + 5 + 5 + 5 =$	41	$2 \times 8 =$
20	$4 \times 5 =$	42	$8 \times 2 =$
21	$5 \times 4 =$	43	$7 + 7 + 7 + 7 =$
22	$2 \times 2 =$	44	$4 \times 7 =$

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**B**

Improvement \_\_\_\_\_

# Correct \_\_\_\_\_

Add or multiply.

1	$2 + 2 + 2 =$	23	$4 + 4 + 4 =$
2	$3 \times 2 =$	24	$3 \times 4 =$
3	$2 \times 3 =$	25	$4 \times 3 =$
4	$5 + 5 + 5 =$	26	$4 + 4 + 4 + 4 =$
5	$3 \times 5 =$	27	$4 \times 4 =$
6	$5 \times 3 =$	28	$4 + 4 + 4 + 4 + 4 =$
7	$2 + 2 + 2 + 2 =$	29	$4 \times 5 =$
8	$4 \times 2 =$	30	$5 \times 4 =$
9	$2 \times 4 =$	31	$6 + 6 =$
10	$5 + 5 =$	32	$6 \times 2 =$
11	$2 \times 5 =$	33	$2 \times 6 =$
12	$5 \times 2 =$	34	$8 + 8 =$
13	$3 + 3 =$	35	$2 \times 8 =$
14	$2 \times 3 =$	36	$8 \times 2 =$
15	$3 \times 2 =$	37	$7 + 7 =$
16	$2 + 2 + 2 + 2 + 2 =$	38	$2 \times 7 =$
17	$5 \times 2 =$	39	$7 \times 2 =$
18	$2 \times 5 =$	40	$9 + 9 =$
19	$5 + 5 + 5 + 5 =$	41	$2 \times 9 =$
20	$4 \times 5 =$	42	$9 \times 2 =$
21	$5 \times 4 =$	43	$6 + 6 + 6 + 6 =$
22	$2 \times 2 =$	44	$4 \times 6 =$

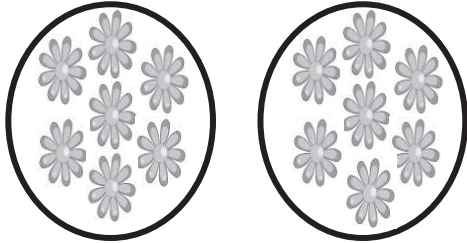
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Name \_\_\_\_\_

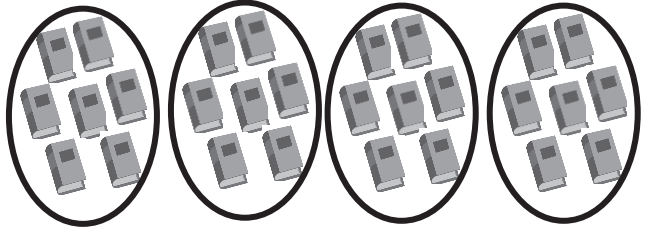
Date \_\_\_\_\_

1.



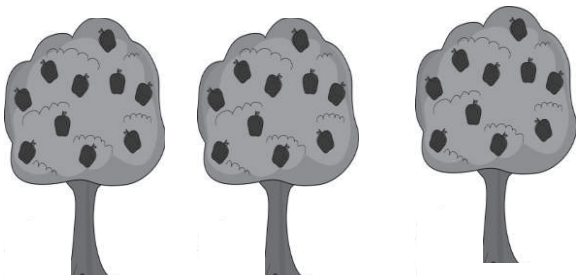
Divide 14 flowers into 2 equal groups.  
There are \_\_\_\_\_ flowers in each group.

2.



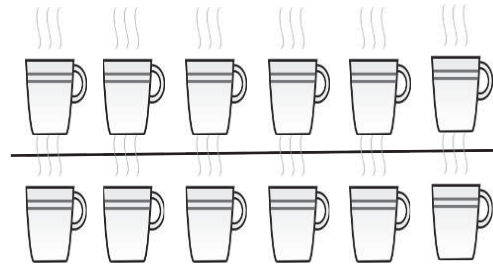
Divide 28 books into 4 equal groups.  
There are \_\_\_\_\_ books in each group.

3.



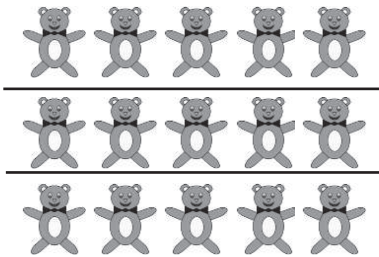
Divide 30 apples into \_\_\_\_\_ equal groups.  
There are \_\_\_\_\_ apples in each group.

4.



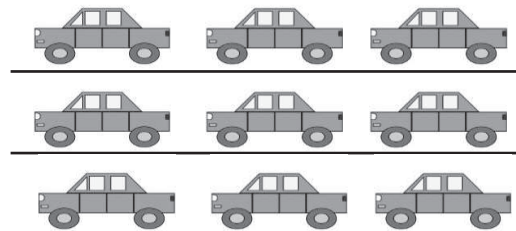
Divide \_\_\_\_\_ cups into \_\_\_\_\_ equal groups.  
There are \_\_\_\_\_ cups in each group.  
 $12 \div 2 = \underline{\hspace{2cm}}$

5.



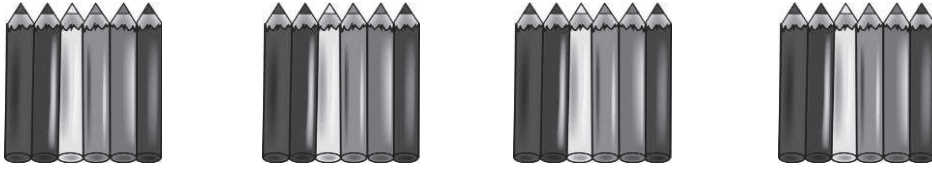
There are \_\_\_\_\_ toys in each group.  
 $15 \div 3 = \underline{\hspace{2cm}}$

6.



$9 \div 3 = \underline{\hspace{2cm}}$

7. Audrina has 24 colored pencils. She puts them in 4 equal groups. How many colored pencils are in each group?



There are \_\_\_\_\_ colored pencils in each group.

$24 \div 4 = \underline{\hspace{2cm}}$

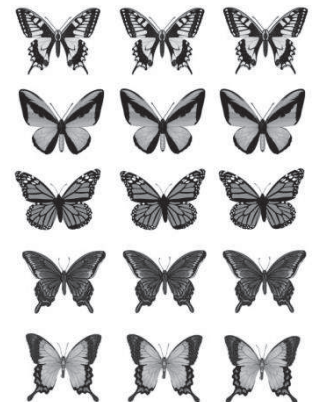
8. Charlie picks 20 apples. He divides them equally between 5 baskets. Draw the apples in each basket.



There are \_\_\_\_\_ apples in each basket.

$20 \div \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

9. Chelsea collects butterfly stickers. The picture shows how she placed them in her book. Write a division sentence to show how she equally grouped her stickers.



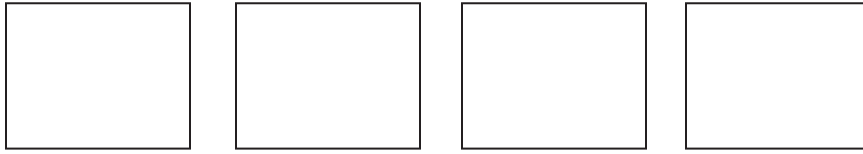
There are \_\_\_\_\_ butterflies in each row.

$\underline{\hspace{2cm}} \div \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. There are 16 glue sticks for the class. The teacher divides them into 4 equal groups. Draw the number of glue sticks in each group.



There are \_\_\_\_\_ glue sticks in each group.

$$16 \div \underline{\quad} = \underline{\quad}$$

2. Draw a picture to show  $15 \div 3$ . Then complete the division sentence.

$$15 \div 3 = \underline{\quad}$$

Name \_\_\_\_\_

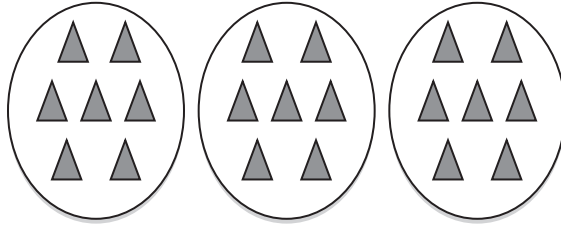
Date \_\_\_\_\_

1.



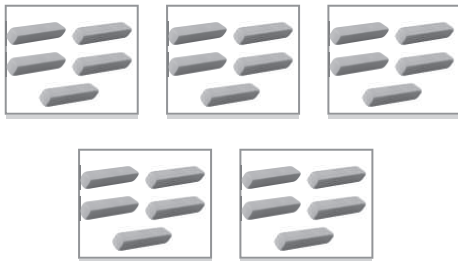
Divide 12 chairs into 2 equal groups.  
There are \_\_\_\_\_ chairs in each group.

2.



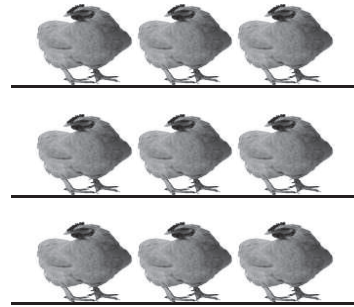
Divide 21 triangles into 3 equal groups.  
There are \_\_\_\_\_ triangles in each group.

3.



Divide 25 erasers into \_\_\_\_\_ equal groups.  
There are \_\_\_\_\_ erasers in each group.

4.



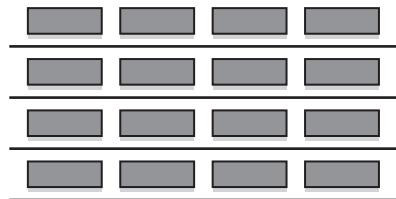
Divide \_\_\_\_\_ chickens into \_\_\_\_\_ equal groups.  
There are \_\_\_\_\_ chickens in each group.  
 $9 \div 3 = \underline{\hspace{2cm}}$

5.



There are \_\_\_\_\_ buckets in each group.  
 $12 \div 4 = \underline{\hspace{2cm}}$

6.



$16 \div 4 = \underline{\hspace{2cm}}$

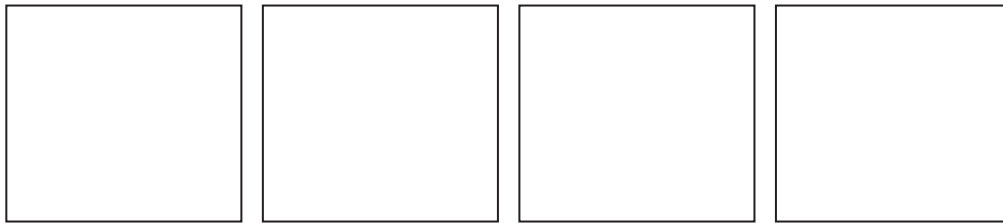
7. Andrew has 21 keys. He puts them in 3 equal groups. How many keys are in each group?



There are \_\_\_\_\_ keys in each group.

$21 \div 3 = \underline{\hspace{2cm}}$

8. Mr. Doyle has 20 pencils. He divides them equally between 4 tables. Draw the pencils on each table.



There are \_\_\_\_\_ pencils on each table.

$20 \div \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

9. Jenna has markers. The picture shows how she placed them on her desk. Write a division sentence to represent how she equally grouped her markers.

There are \_\_\_\_\_ markers in each row.

$\underline{\hspace{2cm}} \div \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

