

## Academy of Dover Charter School

***Math Unit: Third Grade-Understand Division***

***Curriculum Resource: Houghton Mifflin Harcourt Go Math! Common Core Edition (Chapter 6)***

Unit Essential Question: How can you use division to find how many in each group or how many equal groups?

Overview: In this unit, students will develop an understanding of multiplication and division strategies for multiplication and division within 100.

**Common Core Standards Addressed:**

- CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.
- CC.3.OA.6-Understand division as an unknown-factor problem
- CC.3.OA.7-Fluently multiply and divide within 100, using strategies such as the relationship between division and multiplication or properties of operations.
- CC.3.OA.5-Apply properties of operations as strategies to multiply and divide (Commutative property of multiplication, Associative property of multiplication, Distributive property).
- CC.3.OA.4- Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations  $8 \times ? = 48$ ,  $5 = \_ \div 3$ ,  $6 \times 6 = ?$

**Standards for Mathematical Practice**

CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them  
 CCSS.Math.Practice.MP2 Reason abstractly and quantitatively.  
 CCSS.Math.Practice.MP3 Construct viable arguments and critique the reasoning of others  
 CCSS.Math.Practice.MP4 Model with mathematics.  
 CCSS.Math.Practice.MP5 Use appropriate tools strategically  
 CCSS.MATH.Practice.MP6 Attend to precision  
 CCSS.MATH.Practice.MP7 Look for and make use of structure  
 CCSS.MATH.Practice.MP8 Look for and express regularity in repeated reasoning

\*When beginning new unit, send parent letter home to introduce the new unit.

### **Introduction/Pre-assessment:**

Use student book page 207-208 GO MATH student edition to introduce unit and as a pre-assessment. Have students complete page 207 (1-7) independently. Direct students to "Math Detective with Carmen Sandiego". Discuss with students how to keep score when playing basketball. Ask students, "what do you need to know?" Allow students to share answers with a partner. Then ask students "how can you use repeated addition to solve this problem?" Allow students to share answers with a partner.

Upon completion of page 207, have students turn to page 208 in GO MATH student edition, which is the back of page 207. Allow students to complete the bubble map with a partner. Ask partners to share their solutions with the class, including the reasoning behind each answer. Direct students to "Understand Vocabulary" on the lower half of the page. **Introduce the new vocabulary words and give examples of each (dividend, related facts, and divisor).**

Collect this page, and use this data to determine students' prior knowledge.

### **Lesson 1: Problem Solving-Model Division**

Objective: Students will be able to solve division problems by using the strategy ACT IT OUT.

Essential Question: How can you use the strategy ACT IT OUT to solve problems with equal groups?

- Common Core Standards Addressed: CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.  
CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
CCSS.Math.Practice.MP4 Model with mathematics.
- Materials Needed: "The Doorbell Rang" book by Pat Hutchins (hard copy or electronic version)  
"Cookies" cut out of paper  
cookie sheet  
paper plates  
SmartBoard

counters

Reteach 6.1 (worksheet)

Enrich 6.1 (worksheet)

Standards Practice 6.1 (worksheet/homework)

paper cups (RTI Tier 2)

index cards

- Vocabulary: no new vocabulary

#### Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning how to use the strategy ACT IT OUT to solve problems with equal groups. Show the essential question (posted in classroom) and tell students that by the end of the lesson, they should be able to answer the essential question. (1-2 minutes)
- *Engage (Access Prior Knowledge)*-Begin by introducing the lesson. Ask students to think about multiplication (Chapter 3-5) and in 1 minute, share with their partner everything they know about the topic. Have students share with class; guide students to identify that "equal groups" are needed to multiply. Tell students that in this chapter, they will also be using equal groups and some of the same strategies used for multiplying may be used in division. (5 minutes)
- *Teach and Talk*-  
Ask students if they have ever baked cookies before. Allow for answers, and then ask students how they arrange the cookies on a cookie sheet. Remind students to think like a mathematician. Guide students to think about arranging the cookies in an array. Tell students that they will be listening to a story about cookies. Introduce the story "The Doorbell Rang" to the students. Tell students they should be listening to the story and thinking about how we can relate it to math. Be sure to display illustrations when reading. When finished reading, show students 18 "cookies" made of construction paper. Tell students that they will be "acting out" the problem. Have 1-3 students come to the front and arrange them on a cookie sheet. Discuss the arrangement of each student with the class. Remind students of the meaning of an array and have students determine a multiplication sentence for the arrays. (15 minutes)
- *Practice*-  
Tell students that they will be getting into groups or partners. Line them up in 2 lines to make an array. Guide students to determine how to break into equal groups by using the array. Provide each group with a different number of "cookies". Allow students to practice arranging their "cookies" into equal groups. Some students may not be able to make equal groups because of their amount of cookies (11, 17, etc). Ask students who are unable to make equal groups, what needs to be done in order to have equal groups

(give a cookie away, eat a cookie, bake more cookies). Allow students time to make changes to their arrays. Have students “document” their process and the steps they took to solve the problem. Have students share their results whole group. (30 minutes)

- *Conclusion*-Provide index card to each student. Remind student of the essential question (posted in classroom). Instruct students to answer the essential question on the index card as an “exit ticket”. Check student responses for understanding. Assign Standards Practice book page 105-106 for homework. (5 minutes)

- *Response to Intervention:*

Tier 1: Provide graphic organizer used during classwork. Provide students with the following problem: Pam bought 20 party favors. There are 5 favors in each pack. How many packs of party favors did Pam buy? Ask students “What are you asked to find?” and “What information will you use?” Discuss solving the problem and have students share strategies. Provide Reteach 6.1 for additional practice if needed.

Tier 2: Provide students with the following problem: Henry bought 2 equal packages of balloons. He has 14 balloons. How many balloons were in each package? Ask students “What are you being asked to find?” and “What information will you use to solve the problem?” Have students use paper cups to represent packages. Ask students how many cups they will need. Have students put one counter in each cup until all 14 counters have been used. Ask students “How many counters are in each cup?” and “What do the counters in each cup represent?” Students should be able to identify how many balloons were in each package. Provide students with additional problems to solve using the cups and counters. Provide reteach 6.1 for additional practice if needed.

Enrichment: Provide students with Enrich 6.1

## Lesson 2: Size of Equal Groups

Objective: Students will be able to use models to explore the meaning of partitive (sharing) division.

Essential Question: How can you use “model a division problem” to find how many in each group?

- Common Core Standards Addressed: CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

- Materials Needed: pages 213-216 in GO Math student edition  
SmartBoard  
access to GO Math online tools  
counters  
math journals  
Standards Practice 6.2 (worksheet/homework)  
Reteach 6.2 (as needed)  
Enrichment 6.2 (as needed)  
paper plates (RTI-Tier 1)  
masking tape (RTI-Tier 2)  
index cards
- Vocabulary: divide

#### Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning how they can model a division problem to find how many in each group. Show the essential question (posted in classroom) and tell students that by the end of the lesson, they should be able to answer the essential question. (1 minute)
- *Engage (Access Prior Knowledge)*-Review previous day's lesson. Ask students to identify something that multiplication and previous lesson have in common. Allow students "think time" and then share. Students should remember that both multiplication and previous lesson involve finding "equal groups". Tell students that today's lesson will also require using equal groups. (4 minutes)
- *Teach and Talk*-  
UNLOCK THE PROBLEM: Have students open their GO Math Student Edition to page 213. Project GO Math Student Edition (page 213) on SmartBoard. Read "Unlock the Problem" aloud for students. Ask students "When we are solving word problems, what are the steps that we take?" Students should respond by stating that we find the question, underline it, find the information provided, and circle the pieces of information. Instruct students to follow these steps in their book. Remind students that when we multiply, we put equal groups together. Tell students that when we divide, we separate things into equal groups. ***Have students add the word "divide" and its definition to their vocabulary in their math journals. Add this new vocabulary word to math word wall.*** Direct students to the ACTIVITY. Provide students with 12 counters. Have students place counters into 3 equal groups and model while instructing. Also demonstrate this strategy with drawing on SmartBoard. Ask students to answer the problem using these strategies. Also ask students "What do the 4 counters in each circle represent?" and "How can you check that 4 rocks in each box is correct?" Have

students discuss their findings with their partner and then share out. Pose the problem "What if Hector had 18 rocks and he put an equal number in each of three boxes? How many rocks would be in each box?" Allow for time to solve and share whole group.

TRY THIS: Have students turn to page 214 and project on the board. Instruct students to complete this problem in partners, reminding students of the steps used to complete a word problem. Allow students to refer back to the example on page 213 as a model. When students complete, allow time to share their descriptions of how they solved the problem. Ask students "What does the number in each square represent?" Ask "When have you had to divide in real life?" "How is using counters to model division different from using counters to model multiplication?" "What if Madison wanted to put an equal number of her 15 rocks into each of 4 boxes?" (20 minutes)

- *Practice-*

SHARE AND SHOW (guided practice)

Project page 215 on board and instruct students to turn to this page. Have students complete #1 and then discuss with a partner. Check for understanding through observation. Provide instruction to complete the table for #2, #3, and #4. Allow students to complete the table and review answers.

ON YOUR OWN

Instruct students to complete page 215-216 individually. Work with any student(s) who may be struggling with the concept. Provide counters in a small group and ask students to "divide" them into groups. Provide additional problems for practice. Provide students who may have mastered the concept with peer-tutoring opportunities for struggling students or additional math practice with division flash cards. (25 minutes)

- *Conclusion-* Provide students with an index card. Show problem on board: Sam has collected 18 seashells for his collection. He is organizing them into 6 groups. How many seashells should he put in each group? Have students solve this problem on the index card. Use this as an informal assessment. Have students complete Standards Practice 6.2 as a homework assignment. (5 minutes)

- *Response to Intervention-*

Tier 1: Give each student in small group, 12 counters and 3 paper plates. Have students count out 3 equal groups from the 12 counters. Have students count out one counter for each plate and continue until all the counters have been placed on plates. Then have students count the number of counters on each plate to find how many are in each group. Repeat the activity having students make 2 equal groups from the 12 counters. Provide Reteach 6.2 for additional practice if needed.

Tier 2: Use masking tape to make 3 large squares on the floor. Ask 6 students to form a group and tell them you want them to separate to make 3 equal groups. Have one student stand in each square. Ask students how they would continue to form these groups. Guide students if needed. Ask "how many students are in each group?"

Repeat this activity by having the 6 students form 2 equal groups. Provide Reteach 6.2 for additional practice if needed.

Enrich: Provide students with a “handful” of counters. Have each student count the number of counters they received. Have them decide if they can make 2 equal groups. Ask them to divide the counters. Have students repeat this activity with other “handfuls” of counters. Ask students to identify if they can make 2 equal groups using odd or even numbers of counters. Provide Enrich 6.2 for additional practice if needed.

### **Lesson 3: Number of Equal Groups**

Objective: Students will be able to use models to explore the meaning of quotative (measurement) division.

Essential Question: How can you model a division problem to find how many equal groups?

- Common Core Standards Addressed: CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.  
CCSS.Math.Practice.MP4 Model with mathematics.
- Materials Needed: pages 217-220 in GO Math student edition  
SmartBoard  
access to GO Math online tools  
counters  
math journals  
Standards Practice 6.3 (worksheet/homework)  
Reteach 6.3 (if needed)  
Enrichment 6.3 (if needed)  
square tiles (RTI-Tier 1)  
counters (RTI-Tier 2)
- Vocabulary: no new vocabulary

Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning how they can model a division problem to find how many equal groups. Show the essential question (posted in classroom) and tell students that by the end of the lesson, they should be able to answer the essential question. (1 minute)
- *Engage (Access Prior Knowledge)*-Revisit previous less in which students learned how to determine how many were in each group. Model and have students “talk through the problem”. Then draw 15 counters on the board. Ask students to think about a multiplication sentence that could be written using these 15 counters. Have students solve and share with partner. Then share answers whole group. Pose the problem “What division situation could the counters represent?” Have students discuss with partner and allow time for sharing whole group. Ask students “Why do you think the same model can be used for both multiplication and division?” (7 minutes)
- *Teach and Talk-*  
 UNLOCK THE PROBLEM: Have students open their GO Math Student Edition to page 217. Project GO Math Student Edition (page 217) on SmartBoard. Read “Unlock the Problem” aloud for students. Ask students “When we are solving word problems, what are the steps that we take?” Students should respond by stating that we find the question, underline it, find the information provided, and circle the pieces of information. Instruct students to follow these steps in their book. Ask students how they can determine if they need to find how many equal groups or how many in each group? Have students look for clue words in the problem and circle them. Ensure that students understand that this time they are given the number in each group and they need to find the number of groups. Have students look at the 12 counters and circle a group of 3 counters. Show on board and check student work. Then have students continue circling groups of 3 until all counters are in groups. Show on board. Ask students how this is similar to other math lessons (making connections). Then ask students “will you need more boxes or fewer boxes if you increase the number of shells in each box?” Have students discuss this with partners and allow 1 person to share from each group.  
 TRY THIS: Have students turn to page 218 and project on the board. Instruct students to complete this problem in partners, reminding students of the steps used to complete a word problem. Allow students to refer back to the example on page 217 as a model. When students complete, allow time to share their descriptions of how they solved the problem. Ask students “What do the circles represent?” and “How can you check that your answer is correct?” Allow students to complete the H.O.T problem. This problem provides students with an opportunity to use higher order thinking skills by posing a “what if...” questions. Have students complete and then discuss steps with a partner. (20 minutes)
- *Practice-*  
 SHARE AND SHOW (guided practice)

Project page 219 on board and instruct students to turn to this page. Have students complete #1 and then discuss with a partner. Check for understanding through observation. Provide instruction to complete the table for #2, #3, and #4. Allow students to complete the table and review answers.

#### ON YOUR OWN

Allow students to complete page 219-220 individually. Work with any student(s) who may be struggling with the concept. Provide counters in a small group and ask students to “divide” them into groups. Provide additional problems for practice. Provide students who may have mastered the concept with peer-tutoring opportunities for struggling students or additional math practice with division flash cards. (25 minutes)

- *Conclusion*-Ask students to think about the essential question. Have students answer the essential question and share with a partner. Allow each set of partners to share. Provide standards practice book 6.3 for homework. (3 minutes)
- *Response to Intervention*-
  - Tier 1: Give each student in small group 15 tiles. Have students make stacks of 3 tiles each. Ask students how many equal stacks of 3 tiles they can make. Then have students separate the tiles into stacks of 15 each, and find how many stacks they can make. Ask “how can you use your answer for the number of stacks of 3 tiles to predict how many stacks of 5 tiles there will be?” Have student complete activity and share. Provide Reteach 6.3 for additional practice if needed.
  - Tier 2: Give each student in small group 8 counters. Have students use the 8 counters to make groups of 2. Ask students “how many counters are in this group?” Show the 4 groups of 2 counters each. Ask “how many groups did we make”, “are the groups equal?”, and “how can you tell?” Have students put the 8 counters into groups of 4. Discuss the results and ask students what they noticed. Provide Reteach 6.3 for additional practice if needed.
  - Enrich: Tell students to write a word problem about finding how many in each group. For example: Bessie has 18 apples. She wants to put an equal number of apples in each of 3 bowls. How many apples does she put in each bowl? Tell students to write a word problem about finding the number of groups. For example: Jen has 20 pears. She wants to put 4 pears on each plate. How many plates will she need? Have students share and solve their problems. Students should explain whether they were finding how many groups or how many in each group. Provide Enrich 6.3 for additional practice if needed.

#### Lesson 4: Model with Bar Models

Objective: Students will be able to model division by using equal groups and bar models.

Essential Question: How can you use bar models to solve division problems?

- Common Core Standards Addressed: CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.  
CCSS.Math.Practice.MP4 Model with mathematics.  
CCSS.Math.Practice.MP2 Make sense of problems and persevere in solving them.
- Materials Needed: pages 221-224 in GO Math student edition  
SmartBoard  
access to GO Math online tools  
counters  
math journals  
white board  
Standards Practice 6.4(worksheet/homework)  
Reteach 6.4 (if needed)  
Enrichment 6.4 (if needed)  
strips of paper, counters (RTI-Tier 1)  
counters (RTI-Tier 2)
- Vocabulary: dividend, divisor, quotient

#### Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning how they can use bar models to solve division problems. Show the essential question and tell students that by the end of the lesson, they will be able to answer this question. (1 minute)
- *Engage (Access Prior Knowledge)*-Discuss student knowledge of bar models. Discuss how we used bar models in other math areas (addition, subtraction, multiplication). Tell students that bar models can also be used as a tool/strategy to solve division problems. Begin by drawing 12 counters on the board. Ask students to describe the steps for dividing the counters into 4 equal groups. Ask students “why is it helpful to put 1 counter in each group at a time?” Have students share with a partner and then choose a few to share whole group. (5 minutes)
- *Teach and Talk-*

**UNLOCK THE PROBLEM:** Have students open their GO Math Student Edition to page 221. Project GO Math Student Edition (page 221) on SmartBoard. Read "Unlock the Problem" aloud for students. Ask students "When we are solving word problems, what are the steps that we take?" Students should respond by stating that we find the question, underline it, find the information provided, and circle the pieces of information. Instruct students to follow these steps in their book.

**ACTIVITY 1:** Read the directions for the activity. Be sure students place one counter at a time in each group. After students complete the page, ask: "How do you know your answer is correct?" Discuss how the parts of the bar model are related to the problem. To show that each dog represents one group, you can have students draw a line from each dog to one of the boxes on the bar model. Ask "Why are there 5 equal bars in the bar model?" Then ask students to compare and contrast the bar model with using counters.

**ACTIVITY 2:** In this activity, students find the number of equal groups, or how many dogs are in each class. Have students show the division using the counters, then interpret the parts of the bar model. Have students discuss the following questions with a partner: Why did you circle groups of 5; What does the bar with the number 5 represent; What do the dashed lines represent; How is ACTIVITY 2 different from ACTIVITY 1?

***Introduce new vocabulary and have students record in their math journals. Provide the example:***

$$\begin{array}{ccccccc} 20 & \div & 5 & = & 4 \\ \text{dividend} & & \text{divisor} & & \text{quotient} \end{array}$$

***and discuss each part of the equation (this information is also in their student books).***

***Add new vocabulary to math word wall. (25 minutes)***

- ***Practice-***

**SHARE AND SHOW** (guided practice)

Project page 222 on board and instruct students to turn to this page. Have students complete #1 and then discuss with a partner. Check for understanding through observation. Have students complete #2 and #3 on page 223 to check for understanding.

**ON YOUR OWN**

Allow students to complete page 223-224 individually. Direct students to complete #13 as a concluding problem. This problem requires students to use higher order thinking skills. Allow students 5 minutes to work on this problem individually. Then allow students to work in partners and discuss the problem. Work with any student(s) who may be struggling with the concept. Provide counters in a small group and ask students to "divide" them into groups. Use white board to model with the bar model. Provide additional problems for practice. Provide students who may have mastered the concept with peer-tutoring opportunities for struggling students or additional math practice with division flash cards. (25 minutes)

- *Conclusion*-Ask students to think about the essential question. Have students answer the essential question and share with a partner. Allow each set of partners to share. Provide standards practice book 6.4 for homework. (4-6 minutes)
- *Response to Intervention*-  
Tier 1: Read aloud the following situation: Luisa has 8 eggs. She needs to make 4 equal groups of eggs. Display a paper strip. Tell students to think that whole strip represents 8 eggs. Ask them how they would fold the paper to show 4 equal groups. Allow students to fold paper strips. Then have students share their paper folding and work with students to draw a bar model to match their paper strips with the folds. Now have students use counters to represent the eggs and divide 8 counters equally into the 4 sections of the paper strips. Have students tell how many eggs are in each group. Provide Reteach 6.4 for additional practice if needed.  
Tier 2: Have students draw 5 circles on a sheet of paper. Ask students “if we divide 15 counters into 5 equal groups, how many counters will be in each group?” Guide students to place one counter at a time in each circle. Ask “how many counters are in each group?” Write the division sentence on the board. Guide students to state that 15 is the total number of counters, 5 is the number of groups, and 3 is the number in each group. Then model how to draw a bar model to match the circles and division. Have students copy the bar model. Provide Reteach 6.4 for additional practice if needed.  
Enrich: Have students draw all the possible bar models with 12 as a dividend. Tell students they might change the number of equal groups as a strategy to help them find all the possible bar models. Remind students that each number of groups must provide for an equal number in each group. Have students work in pairs to share their bar models. Have students choose one of their bar models and write a story problem to match it. Provide Enrich 6.4 for additional practice if needed.

## Lesson 5: Algebra: Relate Subtraction and Division

Objective: Students will be able to use repeated subtraction and a number line to relate subtraction and division.

Essential Question: How is division related to subtraction?

- Common Core Standards Addressed: CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
 CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

CC.3.OA.7-Fluently multiply and divide within 100, using strategies such as the relationship between division and multiplication or properties of operations.  
CCSS.Math.Practice.MP2 Reason abstractly and quantitatively

- Materials Needed: pages 225-228 in GO Math student edition  
SmartBoard  
access to GO Math online tools  
math journals  
white board  
Standards Practice 6.5(worksheet/homework)  
Reteach 6.5 (as needed)  
Enrich 6.5 (as needed)  
counters (RTI-Tier 1)  
counters, masking tape, index cards, marker (RTI-Tier 2)  
Real World video (Go Math curriculum-online) Ch. 6  
index cards
- Vocabulary: no new vocabulary

#### Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning how division is related to subtraction. Show the essential question and tell students that by the end of the lesson, they will be able to answer this question. (1 minute)
- *Engage (Access Prior Knowledge)*-Use the Real World Video to introduce students to recycling. Ask: What does recycling mean? What are some things that can be recycled? What are some ways recycling helps the environment? (4 minutes)
- *Teach and Talk*-  
UNLOCK THE PROBLEM: Have students open their GO Math Student Edition to page 225. Project GO Math Student Edition (page 225) on SmartBoard. Read "Unlock the Problem" aloud for students. Ask students "When we are solving word problems, what are the steps that we take?" Students should respond by stating that we find the question, underline it, find the information provided, and circle the pieces of information. Instruct students to follow these steps in their book.  
ONE WAY: This method uses repeated subtraction to divide. Remind students that we used repeated addition to add. Also remind students that division is the opposite of multiplication. So if we use repeated addition to multiply, we can use repeated subtraction to divide. Demonstrate on board. Have students assist with computation. Provide additional examples if necessary. Ask students to explain (to a partner) how to

use subtraction to divide. Discuss why it is important to continue subtracting until you get 0.

ANOTHER WAY: This way uses a number line to count back by 2's to divide. Remind students how we used a number line to multiply. Demonstrate on board. Have students discuss these questions with a partner: Why did you start at 12 and count backwards? What do the number of jumps represent? (15 minutes)

- *Practice-*

SHARE AND SHOW (guided practice)

Have students complete #1 and then discuss with a partner. Check for understanding through observation. Have students complete #2 and #3 to check for understanding.

ON YOUR OWN

Instruct students to complete page 227-228 individually. Provide specific instructions for #8 (Write a word problem that can be solved by using one of the division equations above). Provide students with an example. Also, direct students to #14 which is a higher order thinking problem. Have students work in pairs on this problem and document steps taken to solve this problem. Work with any student(s) who may be struggling with the concept. Give examples of repeated subtraction and provide number lines in necessary. Provide additional problems for practice. Provide students who may have mastered the concept with peer-tutoring opportunities for struggling students or additional math practice with division flash cards. (35 minutes)

- *Conclusion-*Provide index card. Give students 2 division problems. Have them solve 1 using repeated subtraction and the second using a number line. Collect for an informal assessment. Provide standards practice book 6.5 for homework. (5 minutes)

- *Response to Intervention-*

Tier 1: Have students start with a pile of 15 counters. One at a time, have students remove 3 counters from the pile and write the subtraction equation that corresponds with their counters on white boards. Ex: The first student removes 3 counters from the pile and writes:  $15-3=12$ . The second student removes 3 counters from the pile and write  $12-3=9$ . Students continue to remove counters and write subtraction equations until there are no more counters in the pile. Have students count the number of times they subtracted 3 and write the division equation. Discuss the relationship between subtraction and division. Provide Reteach 6.5 for additional practice if needed.

Tier 2: Use the masking tape and index cards to make a large, 0-12 number line on the floor. Ask a volunteer to stand on 8 and then jump back 2 spaces until he or she reaches 0. Have the student place a counter on the index card at each number he or she lands on. Ask students how many counters are on the number line and how many jumps were made. Write the division sentence on the board and discuss how each number in the equation was modeled by the activity. Provide Reteach 6.5 for additional practice if needed.

Enrich: Write the following riddle on the board: Subtract 3 from me 6 times and you will reach 0. What number am I? Have students solve the problem and then write the division equation it represents. Then have students write their own division riddles. Provide Enrich 6.5 for additional practice if needed.

### Mid-Chapter Checkpoint

At this point in the unit, students will complete a “mid-chapter checkpoint” which is a formal assessment for Lessons 1-5 of this unit. (Student book pages 229-230) Use this assessment to determine if additional instruction is needed on division concepts previously taught. (see “Data-Driven Decision Making”; TE p. 229-230)

### Lesson 6: Model with Arrays

Objective: Students will be able to model division by using arrays.

Essential Question: How can you use arrays to solve division problems?

- Common Core Standards Addressed: CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.  
CCSS.MATH.Practice.MP4 Model with mathematics  
CCSS.MATH.Practice.MP5 Use appropriate tools strategically
- Materials Needed: pages 231-234 in GO Math student edition  
SmartBoard  
math journals  
white board  
square tiles  
Standards Practice 6.6(worksheet/homework)  
Reteach 6.6 (if needed)  
Enrich 6.6 (if needed)  
square tiles (RTI-Tier 1)  
square tiles (RTI-Tier 2)  
1-centimeter grid paper (RTI-Enrich)  
index cards

- Vocabulary: no new vocabulary

Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning how they can use arrays to solve division problems. (1 minute)
- *Engage (Access Prior Knowledge)*-Remind students of first lesson, in which the story "The Doorbell Rang" was read. Discuss the arrangement of the cookies (students should remember that the cookies were arranged in arrays). Have students use square tiles to review making arrays for multiplication. Remind students that an array is a set of objects arranged in rows and columns. There is the same number in each row. Ask students to think about an example of a time in the real world where arrays might be found (chairs, desks, parking lots, etc.) Have students model  $4 \times 5 =$  using their tiles. Discuss how they found the product. (7 minutes)
- *Teach and Talk*-  
 INVESTIGATE: Have students open their GO Math Student Edition to page 231. Project GO Math Student Edition (page 231) on SmartBoard. Students will work with a partner. Provide each group of partners with 30 square tiles. Ask students to make an array to find how many rows of 5 are in 30. Have students to make a row of 5 tiles and continue to make as many rows of 5 tiles as they can. Ask students to share how many rows they made.  
 DRAW CONCLUSIONS: Have students draw the array they made using the square tiles on page 232. Discuss how to write a division equation using the square tiles. Ask students why 30 is the dividend and what represents the quotient in this array.  
 TRY THIS-Provide students with 24 tiles. Ask students to (individually) make an array with the same number of tiles in 4 rows. Direct students to place 1 tile in each of 4 rows and continue placing 1 tile in each row until all tiles have been used. Then have students draw the array they completed using tiles and write the division equation (student book page 232). (20 minutes)
- *Practice*-  
 SHARE AND SHOW (guided practice)  
 Have students complete #1 and #5 and discuss with a partner. Review answers and strategies whole group to ensure understanding. Then have students continue to work individually to complete pages 233-234. (20 minutes)  
*Conclusion*-Ask students to think about other "real-world" examples in which arrays could be used (desk arrangement, photo album, board games, etc.). Provide index card. Have students write down their real world example and to model it using pictures. Also have students describe their array in complete sentences. Provide standards practice book 6.6 for homework. (10 minutes)
- *Response to Intervention*-

Tier 1: Give students 10 tiles. Have students arrange the tiles in rows of 5 tiles each. Ask how many tiles are in each row and how many rows are there. Model how to write a division equation for the example. Ask students to think of another way to arrange the 10 tiles in the array and have them provide a division equation for that array. Ask students to share thoughts about the arrays (similarities/differences). Provide Reteach 6.6 for additional practice if needed.

Tier 2: Model how to make an array with 3 rows of 6 tiles each. Ask students: How many tiles are in all; how many tiles are in each row; how many rows are there? Have students help to write a division equation for the array. Verbally connect each number in the division equation to the array. Give students 15 tiles and ask them to make an array with 3 tiles in each row. Ask students the same questions from the first example. Then have them use their answers to write a division equation. Provide Reteach 6.6 for additional practice if needed.

Enrich: Write the following numbers on the board: 18, 20, 24, and 30. Have students choose one of the numbers. Tell students to draw as many arrays as possible to represent that number on the grid paper. Each array should have from 1-10 rows and columns. Then have students write a corresponding division equation for each array. Provide Enrich 6.6 for additional practice if needed.

## **Lesson 7: Algebra: Relate Multiplication and Division**

Objective: Students will be able to use bar models and arrays to relate multiplication and division as inverse operations.

Essential Question: How can you use multiplication to divide?

- Common Core Standards Addressed: CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.  
CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
CC.3.OA.6-Understand division as an unknown-factor problem  
CC.3.OA.7-Fluently multiply and divide within 100, using strategies such as the relationship between division and multiplication or properties of operations.  
CC.3.OA.4- Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations  $8 \times ? = 48$ ,  $5 = \_ \div 3$ ,  $6 \times 6 = ?$   
CCSS.MATH.Practice.MP1 Make sense of problems and persevere in solving them.  
CCSS.MATH.Practice.MP2 Reason abstractly and quantitatively

CCSS.MATH.Practice.MP6 Attend to precision

CCSS.MATH.Practice.MP7 Look for and make use of structure

CCSS.MATH.Practice.MP8 Look for and express regularity in repeated reasoning.

- Materials Needed: Foam dice (2 for each group of 2 students)  
SmartBoard  
math journals  
white board  
Standards Practice 6.7(worksheet/homework)  
Reteach 6.7 (if needed)  
Enrich 6.7 (if needed)  
square tiles (RTI-Tier 1)  
index cards

- Vocabulary: inverse operations

Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning how division is related to multiplication. Show the essential question and tell students that by the end of the lesson, they will be able to answer this question. (1 minute)
- *Engage (Access Prior Knowledge)*-Ask students to share what strategies they know for multiplication. List the strategies on the board. Tell students that some of these strategies can be used for division and that knowing their multiplication facts can help them understand division. (5 minutes)
- *Teach and Talk*-  
Ask for 3 volunteers to come up front. Ask students "how many students do I have?" Write 3 students on the board. Ask students "how many eyes does one student have?" Write "each student has 2 eyes" on the board. Ask students "how many eyes do all 3 students have all together?" Allow students to respond. Have students tell a partner how they solved that problem. Share responses. Now ask students "what about if I have 6 eyes and they are shared equally between 3 people?" (Write this on board) Ask "how many eyes would each person have?" Ask students to come up with an equation for both scenarios. Ask students to think about the similarities and differences between the equations. Allow for student response and share. (10 minutes)
- *Practice*-  
(guided practice)  
Tell students that today's activity will be in partners. Explain to groups that each pair will get a pair of foam dice. Each person will roll 1 dice. (Model this with a student). Use each number as a factor in a multiplication problem and write on the board. Ask students to solve the multiplication problem. Ask students if there are any other

multiplication equations that could relate to the example (commutative property). Have each pair discuss if they can relate a division sentence to the equation. ***Introduce new vocabulary (inverse operation) and add it to the math word wall.*** (10 minutes)  
(Independent practice)

Provide each pair with 2 foam dice. Tell students to use the dice to make a multiplication equation and solve. Then ask students if they could use those numbers to make a division sentence. Then have students write a word problem for one of the equations. Have students repeat this process. (25 minutes)

- ***Conclusion***-Have each pair provide a word problem to another pair. Students will solve the word problems on an index card including number sentences. Check cards for understanding. (5 minutes)

- ***Response to Intervention-***

***Tier 1:*** Give each small group 12 tiles and have students make an array with 3 rows of 4 tiles each. Have students write the multiplication equation that shows 3 groups of 4. Ask students if they can use the same array to solve the division problem of  $12 \div 4$ . Have students identify the rows of 4 and ask how many groups of 4 are in 12. Repeat the activity by having students make another array and then write a multiplication and division equation for it. Discuss how multiplication and division are related. Provide Reteach 6.7 for additional practice if needed.

***Tier 2:*** Help students understand the relationship between multiplication and division by having them act out situations about forming teams. Say "Suppose we need 3 teams of 2 people to play a game. How many players in all would be on the 3 teams?" Ask students to form teams to act out the situation. Guide students to understand that multiplication can be used to find how many players there are in all. Write  $3 \times 2 = 6$  on a white board. Now say "Suppose we have 6 players and want to form 3 equal teams. How many players would be on each team?" Have 6 students act out the new situation. Write the division equation  $6 \div 3 = 2$  on a white board. Discuss how the 2 situations are related. Provide Reteach 6.7 for additional practice if needed.

***Enrich:*** Have students write the following equations in their journals:

1.  $20 \underline{\hspace{1cm}} 5 = 5 \underline{\hspace{1cm}} 5$
2.  $9 \underline{\hspace{1cm}} 4 = 40 \underline{\hspace{1cm}} 4$
3.  $16 \underline{\hspace{1cm}} 2 = 10 \underline{\hspace{1cm}} 2$
4.  $45 \underline{\hspace{1cm}} 5 = 9 \underline{\hspace{1cm}} 1$

Have students complete the missing blanks by using + , - , x , or ÷.

Then ask students to write at least 2 more operation equations like the examples.

Provide Enrich 6.7 for additional practice if needed.

## Lesson 8: Write Related Facts

Objective: Students will be able to write related multiplication and division facts.

Essential Question: How can you write a set of related multiplication and division facts?

- Common Core Standards Addressed: CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.  
CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
CC.3.OA.7-Fluently multiply and divide within 100, using strategies such as the relationship between division and multiplication or properties of operations.  
CCSS.Math.Practice.MP2 Reason abstractly and quantitatively
- Materials Needed: pages 235-237 in GO Math student edition  
SmartBoard  
math journals  
white board  
square tiles  
Standards Practice 6.8 (worksheet/homework)  
Reteach 6.8 (if needed)  
Enrich 6.8 (if needed)  
square tiles (RTI-Tier 1)  
counters (RTI-Tier 2)
- Vocabulary: related facts

Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning how to write a set of related multiplication and division facts. Show the essential question and tell students that by the end of the lesson, they will be able to answer this question. (1 minute)
- *Engage (Access Prior Knowledge)*-Remind students of previous lesson and discuss "inverse operations". Ask students how multiplication and division are related. Discuss. Have students work in pairs, giving each other a multiplication equation with an unknown number. For example,  $4 \times ? = 8$ . The partner will state the unknown number and then gives a related multiplication equation with an unknown number for the first

player to solve. For example:  $2 \times 4 = ?$  Have students reverse roles and repeat the activity. (7 minutes)

- *Teach and Talk-*

UNLOCK THE PROBLEM: Have students open their GO Math Student Edition to page 239. Project GO Math Student Edition (page 239) on SmartBoard. Read "Unlock the Problem" aloud for students. Discuss meaning of related facts (a set of related multiplication and division equations). ***Have students enter the new vocabulary and definition in their math journals.***

ACTIVITY: Provide students with square tiles. Direct students through the steps of the activity and complete the related facts. After students have completed the activity, ask the following questions: 1. How does the array show both division and multiplication? 2. Why are there only 3 numbers used in a set of related facts? 3. Suppose an array showed 4 rows of 5 tiles. What numbers would you use to write the related facts? 4. What are the related facts for 4, 5, and 20? 5. How are the equations in a set of related facts alike? How are they different? Discuss answers whole group.

TRY THIS: Show students page 240 on board (and have them turn to this page in their books). Have students complete the array with 4 rows of 4 tiles. Ask students to complete the multiplication and division equations. Discuss why there are only 2 related facts for this array. Ask students to answer these questions with partners: 1. What are some other sets of numbers that will have only two equations in the set of related facts? 2. How do you know a set of numbers will have only 2 equations in the set of related facts? Allow time for partners to discuss, then share whole group. (15 minutes)

- *Practice-*

SHARE AND SHOW (guided practice)

Have students complete #1 and then discuss with a partner. Check for understanding through observation. Have students complete #2-#5 to check for understanding.

ON YOUR OWN

Allow students to complete page 241-242 individually. Direct students to #19 (students must determine the error in the word problem). Remind students to think like mathematicians. Work with any student(s) who may be struggling with the concept. Provide additional problems for practice. Provide students who may have mastered the concept with peer-tutoring opportunities for struggling students or additional math practice with division flash cards. (30 minutes)

- *Conclusion-* Ask students to write 2 sets of related facts and to prove how they are related. Students must use models and words to complete this task. Remind students of essential question and discuss answers to the essential question. Provide standards practice book 6.8 for homework. (7 minutes)

- *Response to Intervention-*

Tier 1: Give each student square tiles. Have students make an array with 2 rows of 6 tiles each. Have students work together to write all the multiplication and division equations they can to represent that array. Ask students what numbers were used in all the equations. Tell students that 2, 6, and 12 can be used to write related facts. Ask the groups to find another set of numbers that can be used to write related facts. Provide Reteach 6.8 for additional practice if needed.

Tier 2: Have students use counters to make 3 groups of 4 counters. Ask students “How can we find how many counters there are in all?” Encourage students to suggest using multiplication. Repeat for 4 groups of 3 counters. Write  $4 \times 3 = 12$  on white board. Next, have students use the counters to model  $12 \div 4 = 3$  and  $12 \div 3 = 4$ . Write equations on the board. Ask students “what do you notice about the equations?” Tell students that four number equations make up the related facts for 3, 4, and 12. Discuss how the equations are related. Provide Reteach 6.8 for additional practice if needed.

Enrich: Draw 2 arrays on the board ( $2 \times 2$  and  $3 \times 3$ ). Point out that each array have the same number of rows and columns. Explain that 4 and 9 are called square numbers because the tiles form a square shape. Have students continue the pattern and find the next two square numbers. They should draw the arrays for the numbers. Provide Enrich 6.8 for additional practice if needed.

## **Lesson 9: Division Rules for 1 and 0**

Objective: Students will be able to divide using the rules for 1 and 0.

Essential Question: What are the rules for dividing with 1 and 0?

- Common Core Standards Addressed: CC.3.OA.3-Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.  
CC.3.OA.2-Interpret whole-number quotients of whole numbers, e.g., interpret 56 divided by 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are portioned into equal shares of 8 objects each.  
CC.3.OA.7-Fluently multiply and divide within 100, using strategies such as the relationship between division and multiplication or properties of operations.  
CC.3.OA.5-Apply properties of operations as strategies to multiply and divide (Commutative property of multiplication, Associative property of multiplication, Distributive property).  
CCSS.MATH.Practice.MP1 Make sense of problems and persevere in solving them

- Materials Needed: pages 243-246 in GO Math student edition  
SmartBoard  
math journals  
white board  
counters  
Standards Practice 6.9 (worksheet/homework)  
Reteach 6.9 (if needed)  
Enrich 6.9 (if needed)  
counters, paper plates (RTI-Tier 1)  
connecting cubes, transparent cups (RTI-Tier 2)

- Vocabulary: no new vocabulary

Lesson Overview:

- *Essential Question/Purpose*-Tell students that today they will be learning the rules for dividing with 1 and 0. Show the essential question and tell students that by the end of the lesson, they will be able to answer this question. (1 minute)
- *Engage (Access Prior Knowledge)*-Review using counters to model division problems. Solve division problems by finding the number in each group and some by finding the number of groups. Ask students "How do you know when to divide and when to multiply to solve a problem?" (5 minutes)
- *Teach and Talk*-  
UNLOCK THE PROBLEM: Have students open their GO Math Student Edition to page 243. Project GO Math Student Edition (page 243) on SmartBoard. Read "Unlock the Problem" aloud for students. **Discuss Rule A (Any number divided by 1 equals that number) and have students write this rule in their journals.** Have students complete the quick picture to show the fish in the fishbowl. Provide additional examples of the rule if needed. **Discuss Rule B (Any number (except 0) divided by itself equals 1) and have students write this rule in their journals.** Have students complete the quick picture to show the fish in the fishbowl. Provide additional examples of the rule if needed. Have students turn to page 244. Read the problem aloud. **Discuss Rule C (Zero divided by any number (except 0) equals 0) and have students write this rule in their journals.** Have students complete the quick picture to show the fish in the fishbowl. Provide additional examples if needed. **Discuss rule D (You cannot divide by 0) and have students write this rule in their journals.** (15 minutes)
- *Practice*-  
SHARE AND SHOW (guided practice)  
Have students complete #1. Check for understanding through observation. Discuss their answers. Have students complete #2-#5 to check for understanding.  
ON YOUR OWN

Allow students to complete page 245-246 individually. Direct students to #28 (Suppose a pet store has 21 birds that are in 21 cages. Use what you know about division rules to find the number of birds in each cage. Explain your answer). Remind students that mathematicians should always be able to explain their thoughts and steps. Work with any student(s) who may be struggling with the concept. Provide additional problems for practice. Discuss "Connect to Reading" on page 246. Briefly remind students about comparing and contrasting. (25 minutes)

- *Conclusion*-Provide students with 5 division equations using 1 and 0. Have them complete and turn in. Check for understanding through completion. Review essential question and discuss. Provide standards practice book 6.9 for additional practice as homework. (5 minutes)
- *Response to Intervention*-  
Tier 1: Ask students to model  $0 \div 3$  using counters and paper plates. Explain to students that the dividend, 0, represents the total number of counters and the divisor, 3, represents the total number of paper plates. The number of counters on each plate equals 0. So,  $0 \div 3 = 0$ . Ask students if they could model  $3 \div 0$ , where 3 is the number of counters and 0 is the total number of plates. Students should see that it is impossible to divide a number of counters equally among 0 paper plates. So, you cannot divide by 0. Provide Reteach 6.9 for additional practice if needed.  
Tier 2: Give each student 2 connecting cubes and 1 cup. Ask "how many cubes can you put in the cup?" Discuss and guide students to write a division equation related to the model. Give each student another cup. Ask them to divide the cubes equally among the cups. Ask "How many cubes will be in each cup?" Guide students to write a division equation for this model. Remove the cubes and ask students how many cubes are in each cup now. Ask students to write a division equation for this model. Remove the cups and give each student 2 cubes. Ask the students "can you divide the cubes equally into 0 cups?" Explain that dividing by 0 is impossible. Provide Reteach 6.9 for additional practice if needed.

Enrich: Have students complete the equations below by filling each blank with +, -, x, or  $\div$ .

$$5 \underline{\quad} 3 \underline{\quad} 4 = 11$$

$$3 \underline{\quad} 4 \underline{\quad} 5 = 7$$

$$0 \underline{\quad} 8 \underline{\quad} 6 = 6$$

$$9 \underline{\quad} 1 \underline{\quad} 3 = 3$$

Then have students write their own mystery operation exercises. Tell students to begin with multiplication or division. This will allow them to follow the order of operations which they will learn in Chapter 7. Provide Enrich 6.9 for additional practice if needed.

## Chapter 6 Review/Test

This can be found in the student GO Math book pages 247-250. This can be used either as review for the test or as a formal assessment. Review the chapter essential question, "How can you use division to find how many in each group or how many equal groups?" Ask students "How are multiplication and division related?" Then ask "What models can help you divide?" Also ask "How can subtraction help you divide?"

After completion, use the rubric on page 249-250 of the GO Math teacher edition to evaluate students' completion of the performance task.

### **Chapter 6 Assessment**

There are 27 questions on the assessment. #1-13 are multiple choice questions. #13-25 require students to solve the problem and write the answer. #26 is a constructed response and #27 is an extended constructed response. Use rubric provided to score.

Dear Family,

During the next few weeks, our math class will be learning about division. We will learn how division is related to subtraction, and how multiplication and division are inverse operations.

You can expect to see homework that provides practice with division.

Here is a sample of how your child will be taught to use repeated subtraction to solve division problems.

## Vocabulary

**dividend** The number that is to be divided in a division problem

**dividend, divisor, quotient** The parts of a division problem. There are two ways to record division.

$$\begin{array}{ccccccc} 10 & \div & 2 & = & 5 \\ \uparrow & & \uparrow & & \uparrow \\ \text{dividend} & & \text{divisor} & & \text{quotient} \end{array}$$
  

$$\begin{array}{r} \text{divisor} \rightarrow 2 \overline{)10} \quad \begin{array}{l} 5 \leftarrow \text{quotient} \\ \uparrow \\ \text{dividend} \end{array} \end{array}$$

## MODEL Use Repeated Subtraction to Divide

This is how we will be using repeated subtraction to divide.

### STEP 1

Start with the dividend and subtract the divisor until you reach 0.

$$15 \div 5 = \underline{\quad}$$

$$\begin{array}{r} 15 \\ -5 \\ \hline 10 \end{array} \quad \begin{array}{r} 10 \\ -5 \\ \hline 5 \end{array} \quad \begin{array}{r} 5 \\ -5 \\ \hline 0 \end{array}$$

### STEP 2

Count the number of times you subtract 5.

$$\begin{array}{r} 15 \quad 10 \quad 5 \\ -5 \quad -5 \quad -5 \quad (3 \text{ times}) \\ \hline 10 \quad 5 \quad 0 \end{array}$$

There are 3 groups of 5 in 15.

### STEP 3

Record the quotient.

$$15 \div 5 = 3, \text{ or}$$

$$\begin{array}{r} 3 \\ 5 \overline{)15} \end{array}$$

Fifteen divided by 5 equals 3.

## Tips

### Counting Back on a Number Line

Counting back on a number line is another way to find a quotient. On a 0–15 number line, for example, start at 15 and count back by 5s to 0. Then count the number of jumps on a number line (3 jumps) to find that  $15 \div 5 = 3$ .

## Activity

Display a number of objects that are divisible by 5. Have your child use repeated subtraction to solve division problems. For example: "Here are 20 crayons. I want to subtract 5 crayons at a time until there are no crayons left. How many times can I subtract?" Check answers by arranging the objects.

## Understand Division

## Show What You Know

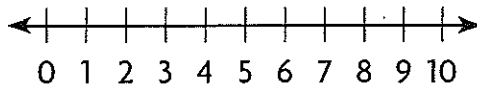


Check your understanding of important skills.

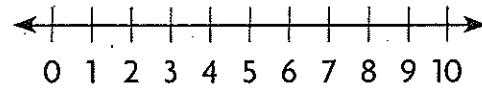
Name \_\_\_\_\_

► Count Back to Subtract Use the number line. Write the difference.

1.  $8 - 5 =$  \_\_\_\_\_

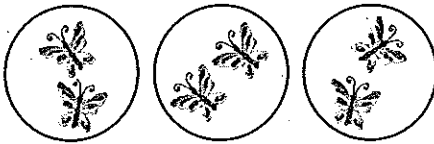


2.  $9 - 4 =$  \_\_\_\_\_



► Count Equal Groups Complete.

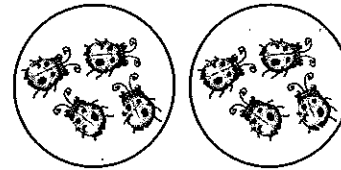
3.



\_\_\_\_\_ groups

\_\_\_\_\_ in each group

4.



\_\_\_\_\_ groups

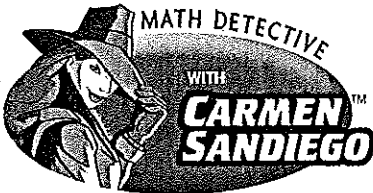
\_\_\_\_\_ in each group

► Multiplication Facts Through 9 Find the product.

5.  $8 \times 5 =$  \_\_\_\_\_

6. \_\_\_\_\_  $= 7 \times 7$

7.  $3 \times 9 =$  \_\_\_\_\_



The table shows 3 different ways you can score points in basketball. Corina scored 12 points in a basketball game. Be a Math Detective to find the greatest number of field goals she could have scored. Then find the greatest number of 3-pointers she could have scored.

**Scoring Points in Basketball**

free throw	1 point
field goal	2 points
3-pointer	3 points



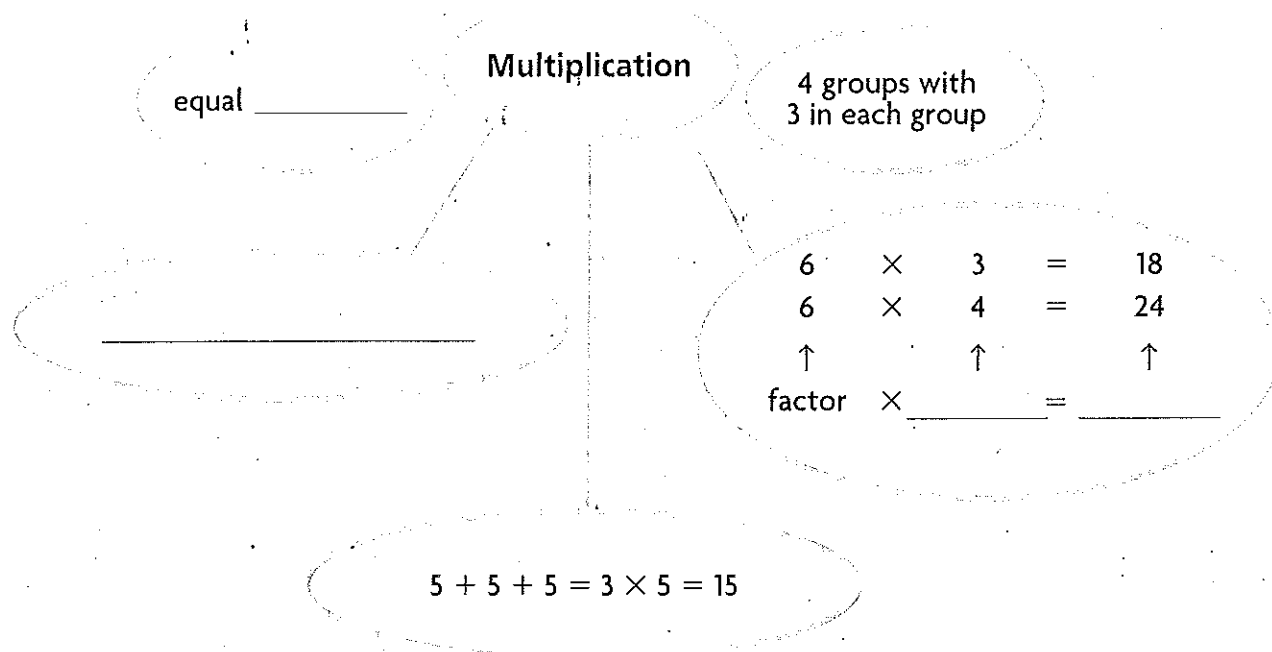
## Vocabulary Builder

### ► Visualize It .....

Complete the bubble map by using the words with a ✓.

What is it like?

What are some examples?



### ► Understand Vocabulary .....

Draw a line to match each word or term with its definition.

#### Preview Words

1. dividend

2. related facts

3. divisor

#### Definitions

A set of related multiplication and division equations

The number that divides the dividend

The number that is to be divided in a division problem

#### Review Words

array

✓ equal groups

equation

✓ factor

Identity Property of  
Multiplication

✓ product

✓ repeated addition

#### Preview Words

divide

dividend

divisor

inverse operations

quotient

related facts

Name \_\_\_\_\_

## PROBLEM SOLVING

### Lesson 6.1

## Problem Solving • Model Division

**Essential Question** How can you use the strategy *act it out* to solve problems with equal groups?

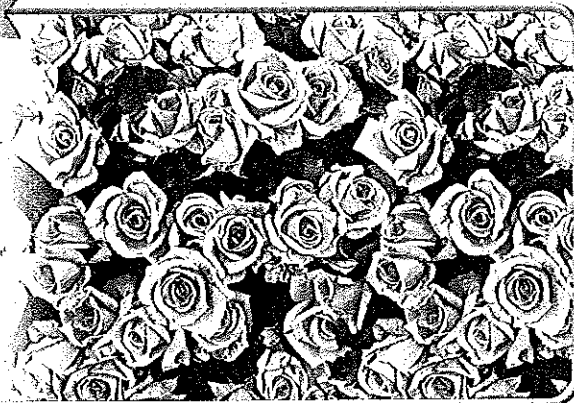
COMMON CORE STANDARD CC.3.OA.3

Represent and solve problems involving multiplication and division.

### UNLOCK the Problem REAL WORLD

Stacy has 16 flowers. She puts an equal number of flowers in each of 4 vases. How many flowers does Stacy put in each vase?

Use the graphic organizer below to solve the problem.



#### Read the Problem

##### What do I need to find?

I need to find the number of \_\_\_\_\_ Stacy puts in each \_\_\_\_\_.

##### What information do I need to use?

Stacy has \_\_\_\_\_ flowers. She puts an equal number of flowers in each of \_\_\_\_\_ vases.

##### How will I use the information?

I will act out the problem by making equal \_\_\_\_\_ with counters.

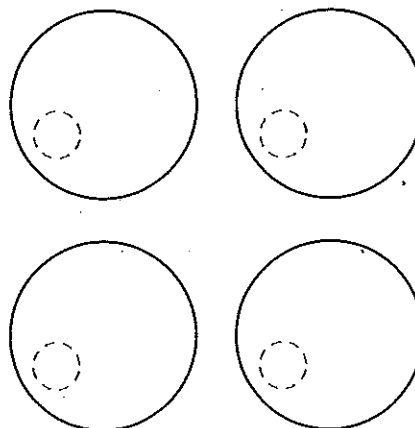
#### Solve the Problem

##### Describe how to act out the problem to solve.

First, count out \_\_\_\_\_ counters.

Next, make \_\_\_\_\_ equal groups. Place 1 counter at a time in each group until all 16 counters are used.

Last, draw the equal groups by completing the picture below.



So, Stacy puts \_\_\_\_\_ flowers in each vase.

## Try Another Problem

Hayden is planning a party. He bakes 21 cookies. If he plans to give each person 3 cookies, how many people will be at his party?



### Read the Problem

**What do I need to find?**

**What information do I need to use?**

**How will I use the information?**

### Solve the Problem

**Describe how to act out the problem to solve.**

- How can you check your answer is reasonable? \_\_\_\_\_

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### Math Talk

Explain how acting out a problem helps you solve it.

MATHEMATICAL PRACTICES

Name \_\_\_\_\_

## Share and Show



### UNLOCK the Problem

Tips

- ✓ Circle the question.
- ✓ Underline important facts.
- ✓ Act out the problem with counters.

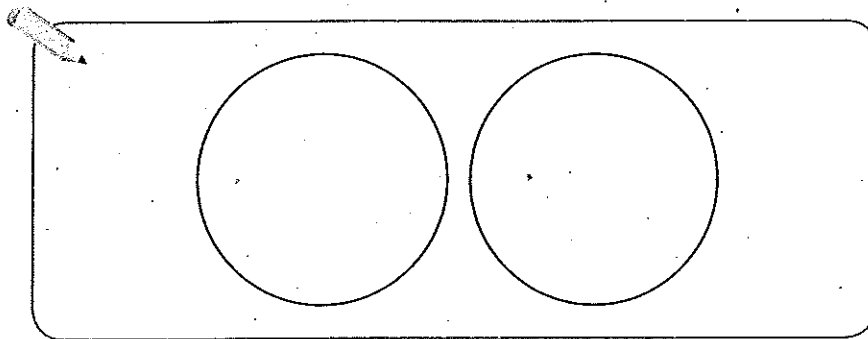
1. Sue is having a party. She has 16 cups. She puts them in 2 equal stacks. How many cups are in each stack?

**First**, decide how to act out the problem.

You can use counters to represent the \_\_\_\_\_.

You can draw \_\_\_\_\_ to represent the stacks.

**Then**, draw to find the number of \_\_\_\_\_ in each stack.



There are \_\_\_\_\_ groups. There are \_\_\_\_\_ counters in each group.

So, there are \_\_\_\_\_ cups in each stack.

2. **What if?** What if Sue has 24 cups and puts 4 cups in each stack? If she already made 4 stacks, how many more stacks can she make with the remaining cups?

\_\_\_\_\_

3. At Luke's school party, the children get into teams to play a game. If there are 35 children and they make teams of 5, how many teams are there?

\_\_\_\_\_

4. Anne put 20 cupcakes on 4 plates. If she put the same number of cupcakes on each one, how many cupcakes did she put on each plate?

\_\_\_\_\_

# On Your Own .....

## Choose a STRATEGY

Act It Out  
Draw a Diagram  
Find a Pattern  
Make a Table

Use the table for 5–6.

5. Sadie's plates came in packages of 5. How many packages of plates did she buy?

\_\_\_\_\_

6. **Write Math** Sadie bought 4 packages of napkins and 3 packages of cups. Which item had more in each package? How many more? Explain how you found your answer.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

7. Megan put 3 red balloons and 4 white balloons at each of 4 tables. How many balloons are at the tables altogether?

\_\_\_\_\_

8. **H.O.T.** There are 12 cookies on plates. List all the ways the cookies could be put equally on the plates.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

9. **Test Prep** Miguel bought 18 party favors. He gave 2 party favors to each of the children at his party. How many children were at Miguel's party?

(A) 20      (B) 16      (C) 9      (D) 8

Sadie's Party Supplies

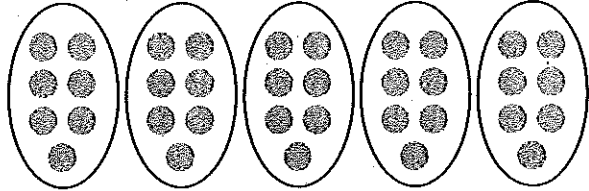
Item	Number
Plates	30
Napkins	28
Cups	24

SHOW YOUR WORK

Name \_\_\_\_\_

## Problem Solving • Model Division

There are 35 people going to the amusement park. They will all travel in 5 vans with the same number of people in each van. How many people will travel in each van?

Read the Problem	Solve the Problem
<b>What do I need to find?</b> I need to find the number of <u>people</u> who will travel in each van.	<b>Describe how to act out the problem to solve.</b> <b>Step 1</b> Start with 35 counters. <b>Step 2</b> Make 5 equal groups. Place 1 counter at a time in each group until all 35 counters are used. <b>Step 3</b> Count the number of counters in each group. <u>7</u>
<b>What information do I need to use?</b> There are <u>35</u> people. <u>5</u> vans are taking all the people to the amusement park.	
<b>How will I use the information?</b> I can act out the problem by making equal <u>groups</u> with counters.	 <p>So, 7 people will travel in each van.</p>

- José packs 54 CDs into small boxes. Each box holds 9 CDs. How many boxes does José pack to hold all 54 CDs?
- Mary volunteers at the library. She has 36 books to put on 4 empty shelves. If Mary puts an equal number of books on each shelf, how many books will be on each shelf?

Name \_\_\_\_\_

## Modeling Problems

Model the problem to solve.

1. Gina needs to make 4 centerpieces with the same number of flowers in each centerpiece for the tables at her party. She bought 32 flowers to use. How many flowers will be in each centerpiece?  
  
\_\_\_\_\_
2. Gina bought 18 balloons. If she makes 3 equal groups of balloons, how many balloons will be in each group?  
  
\_\_\_\_\_
3. Gina bought 24 plates. If she stacks them in groups of 8, how many stacks of plates will she make?  
  
\_\_\_\_\_
4. There will be a total of 20 people at the party. There are 4 tables. If Gina wants an equal number of people at each table, how many chairs should she set at each table?  
  
\_\_\_\_\_

5. **Stretch Your Thinking** Find three more ways Gina could stack 24 plates into equal stacks, with at least 3 plates in a stack. Tell the number of stacks and how many would be in each stack.
- \_\_\_\_\_
- \_\_\_\_\_

**Lesson Check** (CC.3.OA.3)

- Maria buys 15 apples at the store and places them into bags. She puts 5 apples into each bag. How many bags does Maria use for all the apples?  
 (A) 2 (B) 3 (C) 4 (D) 10
- Tom's neighbor is fixing a section of his walkway. He has 32 bricks that he is placing in 8 equal rows. How many bricks will Tom's neighbor place in each row?  
 (A) 3 (B) 4 (C) 5 (D) 6

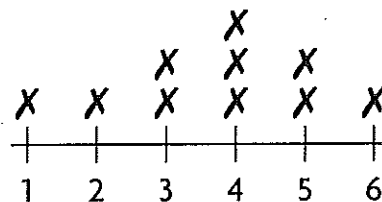
**Spiral Review** (CC.3.OA.1, CC.3.OA.4, CC.3.OA.5, CC.3.MD.4)

- Find the unknown factor. (Lesson 5.2)

$$7 \times \square = 56$$

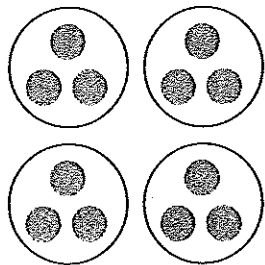
- (A) 6  
(B) 7  
(C) 8  
(D) 9

- How many students practiced the piano more than 3 hours a week? (Lesson 2.7)



- (A) 2 (B) 6 (C) 8 (D) 10

- Count equal groups to find how many there are. (Lesson 3.1)



- (A) 3 (B) 4 (C) 12 (D) 16

- Which is another way to group the factors? (Lesson 4.6)

$$(3 \times 2) \times 5$$

- (A)  $(3 + 2) + 5$   
 (B)  $(3 \times 2) + 5$   
 (C)  $3 \times (2 + 5)$   
 (D)  $3 \times (2 \times 5)$

Name \_\_\_\_\_

## Problem Solving • Model Division

### PROBLEM SOLVING

### Lesson 6.1

COMMON CORE STANDARD CC.3.OA.3

Represent and solve problems involving multiplication and division.

Solve each problem.

1. Six customers at a toy store bought 18 jump ropes. Each customer bought the same number of jump ropes. How many jump ropes did each customer buy?

3 jump ropes

2. Hiro has 36 pictures of his summer trip. He wants to put them in an album. Each page of the album holds 4 pictures. How many pages will Hiro need for his pictures?

3. Katia has 42 crayons in a box. She buys a storage bin that has 6 sections. She puts the same number of crayons in each section. How many crayons does Katia put in each section of the storage bin?

4. Ms. Taylor's students give cards to each of the 3 class parent helpers. There are 24 cards. How many cards will each helper get if the students give an equal number of cards to each helper?

5. Jamie divides 20 baseball stickers equally among 5 of his friends. How many stickers does each friend get?

Name \_\_\_\_\_

# Size of Equal Groups

**Essential Question** How can you model a division problem to find how many in each group?

COMMON CORE STANDARD CC.3.OA.2

Represent and solve problems involving multiplication and division.

## UNLOCK the Problem REAL WORLD

Hector has 12 rocks from Onondaga Cave State Park. He puts an equal number of his rocks in each of 3 boxes. How many rocks are in each box?

• What do you need to find?

• Circle the numbers you need to use.

When you multiply, you put equal groups together. When you **divide**, you separate into equal groups.

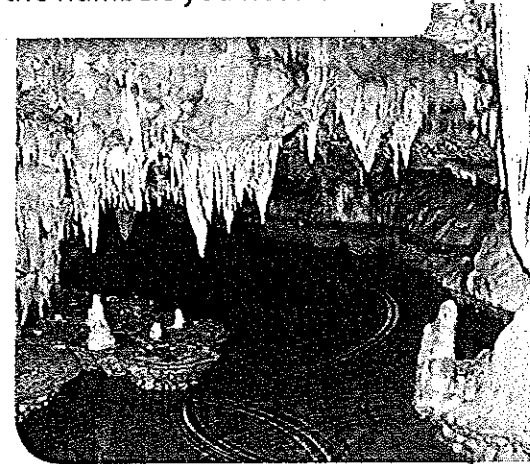
You can divide to find the number in each group.

**Activity** Use counters to model the problem.

**Materials** ■ counters ■ MathBoard

### STEP 1

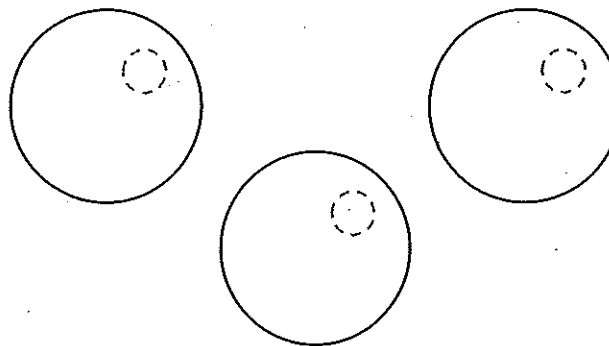
Use 12 counters.



▲ Onondaga Cave is located in Leasburg, Missouri. Over the years, water has formed flowstones and other colorful deposits.

### STEP 2

Draw 3 circles on your MathBoard. Place 1 counter at a time in each circle until all 12 counters are used. Draw the rest of the counters to show your work.



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

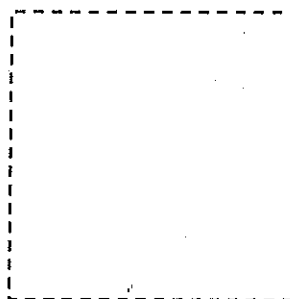
So, there are \_\_\_\_\_ rocks in each box.

### Try This!

Madison has 15 rocks. She puts an equal number of rocks in each of 5 boxes. How many rocks are in each box?

#### STEP 1

Draw 5 squares to show 5 boxes.



#### STEP 2

Draw 1 counter in each square to show the rocks. Continue drawing 1 counter at a time in each box until all 15 counters are drawn.

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

So, there are \_\_\_\_\_ rocks in each box.

#### Math Talk

#### MATHEMATICAL PRACTICES

Describe another way to arrange 15 counters to make equal groups.

1. How many counters did you draw? \_\_\_\_\_
2. How many equal groups did you make? \_\_\_\_\_
3. How many counters are in each group? \_\_\_\_\_

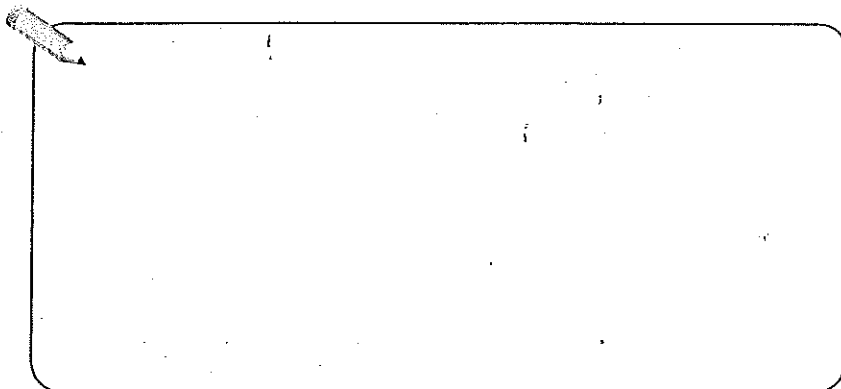
Name \_\_\_\_\_

## Share and Show



1. Jon has 8 counters. He makes 4 equal groups.

Draw a picture to show the number of counters in each group.



**MATHEMATICAL PRACTICES**

### Math Talk

Explain how you made the groups equal.

Use counters or draw a quick picture on your MathBoard. Make equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
2.	10	2	
3.	24	6	
4.	12	4	

## On Your Own

Use counters or draw a quick picture on your MathBoard. Make equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
5.	14	7	
6.	21	3	
7.	20	5	
8.	12	6	
9.	36	9	

# Problem Solving REAL WORLD

Use the table for 10–11.

10. Madison puts all of her photos in a photo album. She puts an equal number of photos on each of 4 pages in her album. How many photos are on each page?

Photos	
Name	Number of Photos
Madison	28
Joe	25
Ella	15



SHOW YOUR WORK

11. H.O.T. Joe and Ella combine their photos. Then they put an equal number on each page of an 8-page photo album. How many photos are on each page?

12. Write Math Rebekah's family found 30 sand dollars. Explain how to share the sand dollars equally among the 6 people in her family.

13. Test Prep Zana has 9 rocks from a trip. She puts an equal number of rocks in each of 3 bags. How many rocks are in each bag?

- (A) 27                      (C) 6  
 (B) 12                      (D) 3

Name \_\_\_\_\_

## Size of Equal Groups

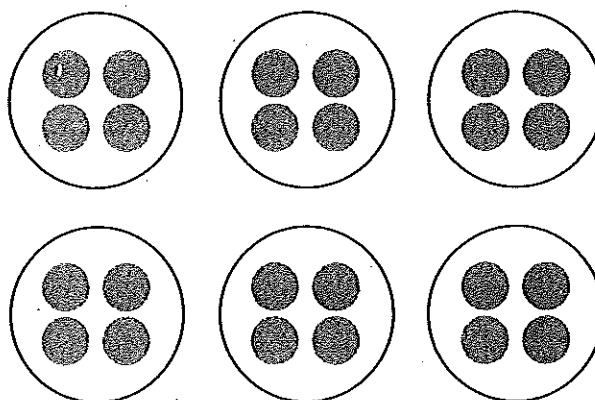
When you **divide**, you separate into equal groups.

**Use counters or draw a quick picture. Make equal groups.**  
**Complete the table.**

Counters	Number of Equal Groups	Number in Each Group
24	6	

The number in each group is unknown, so divide.

Place 1 counter at a time in each group until all 24 counters are used.



There are 4 counters in each of 6 groups.

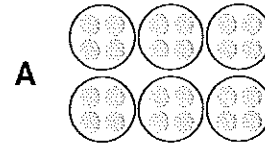
**Use counters or draw a quick picture. Make equal groups.**  
**Complete the table.**

	Counters	Number of Equal Groups	Number in Each Group
1.	12	2	
2.	10	5	
3.	16	4	
4.	24	3	
5.	15	5	

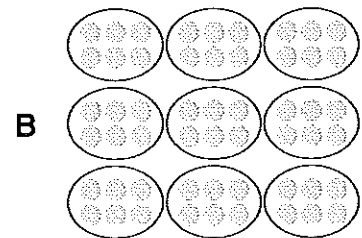
## Matching Models

Draw a line to match each word problem with the model you can use to solve it. Then write the answer.

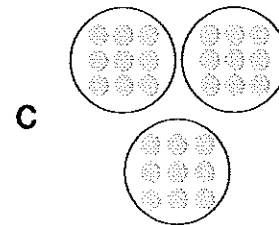
1. Sean has 15 baseball cards. He puts them into equal groups. How many baseball cards does Sean put in each group? •
- \_\_\_\_\_



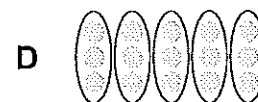
2. Lucy has a box of 24 cookies. She divides them equally among some friends. How many cookies does each friend receive? •
- \_\_\_\_\_



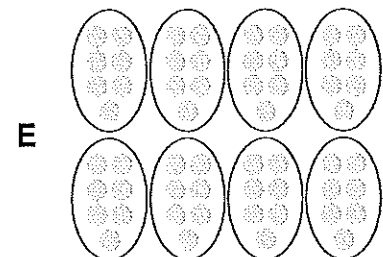
3. Eddie has 56 coins in his collection. He separates the coins into equal groups. How many coins are in each group? •
- \_\_\_\_\_



4. Michael bought 54 juice boxes for a picnic. He plans to put an equal number at each of the picnic tables. How many juice boxes will Michael put at each table? •
- \_\_\_\_\_



5. Leona has 27 feathers to put on some masks. She uses the same number of feathers on each mask. How many feathers does she use on each mask? •
- \_\_\_\_\_



Name \_\_\_\_\_

**Lesson 6.2****Size of Equal Groups**

COMMON CORE STANDARD CC.3.OA.2

Represent and solve problems involving multiplication and division.

Use counters or draw a quick picture. Make equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
1.	15	3	5
2.	21	7	
3.	28	7	
4.	32	4	
5.	9	3	
6.	18	3	
7.	20	5	
8.	16	8	
9.	35	5	
10.	24	3	

**Problem Solving** 

11. Alicia has 12 eggs that she will use to make 4 different cookie recipes. If each recipe calls for the same number of eggs, how many eggs will she use in each recipe?

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12. Brett picked 27 flowers from the garden. He plans to give an equal number of flowers to each of 3 people. How many flowers will each person get?

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## Lesson Check (CC.3.OA.2)

- Ryan has 21 pencils. He wants to put the same number of pencils in each of 3 pencil holders. How many pencils will he put in each pencil holder?  
 (A) 6  
 (B) 7  
 (C) 8  
 (D) 9
- Corrine is setting out 24 plates on 6 tables for a dinner. She sets the same number of plates on each table. How many plates does Corrine set on each table?  
 (A) 3  
 (B) 4  
 (C) 5  
 (D) 6

## Spiral Review (CC.3.OA.1, CC.3.OA.4, CC.3.OA.5, CC.3.OA.9)

- Each table has 4 legs. How many legs do 4 tables have? (Lesson 3.1)  
 (A) 1  
 (B) 8  
 (C) 16  
 (D) 20
- Tina has 3 stacks of 5 CDs on each of 3 shelves. How many CDs does she have in all? (Lesson 4.6)  
 (A) 14  
 (B) 30  
 (C) 35  
 (D) 45
- What is the unknown factor?  
 (Lesson 5.2)
- Which of the following describes a pattern in the table? (Lesson 5.1)

$$7 \times \square = 35$$

Number of packs	1	2	3	4	5
Number of yo-yos	3	6	9	12	?

- 4
  - 5
  - 6
  - 7
- Add 2.
  - Multiply by 2.
  - Multiply by 3.
  - Add 12.

Name \_\_\_\_\_

## Number of Equal Groups

**Essential Question** How can you model a division problem to find how many equal groups?

COMMON CORE STANDARD CC.3.OA.2

Represent and solve problems involving multiplication and division.

**CONNECT** You have learned how to divide to find the number in each group. Now you will learn how to divide to find the number of equal groups.

### UNLOCK the Problem REAL WORLD

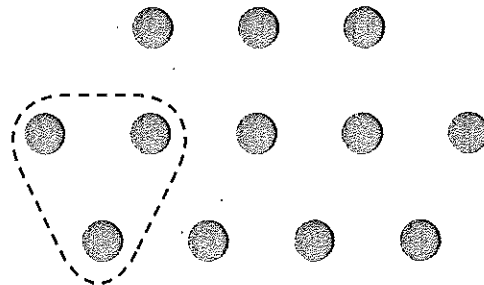
William has 12 shells and some boxes. He wants to put his shells in groups of 3. How many boxes does he need for his shells?

- Underline what you need to find.
- How many shells does William want in each group? \_\_\_\_\_



**Make equal groups.**

- Look at the 12 counters.
- Circle a group of 3 counters.
- Continue circling groups of 3 until all 12 counters are in groups.



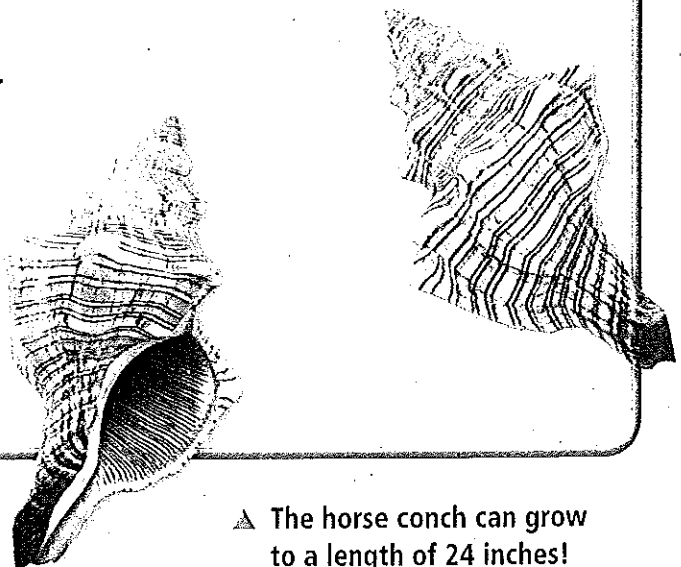
There are \_\_\_\_\_ groups of counters.

So, William needs \_\_\_\_\_ boxes for his shells.

#### Math Talk

Explain how the drawing would change if William wanted to put his shells in groups of 4.

MATHEMATICS PRACTICES



▲ The horse conch can grow to a length of 24 inches!

### Try This!

Sarah has 15 shells. She wants to put each group of 5 shells in a box. How many boxes does she need for her shells?

#### STEP 1

Draw 15 counters.

#### STEP 2

Make a group of 5 counters by drawing a circle around them. Continue circling groups of 5 until all 15 counters are in groups.

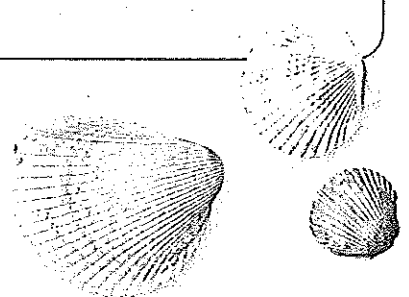
There are \_\_\_\_\_ groups of 5 counters.

So, Sarah needs \_\_\_\_\_ boxes for her shells.

- **H.O.T.** What if Sarah puts her 15 shells in groups of 3?

How many boxes does she need? \_\_\_\_\_

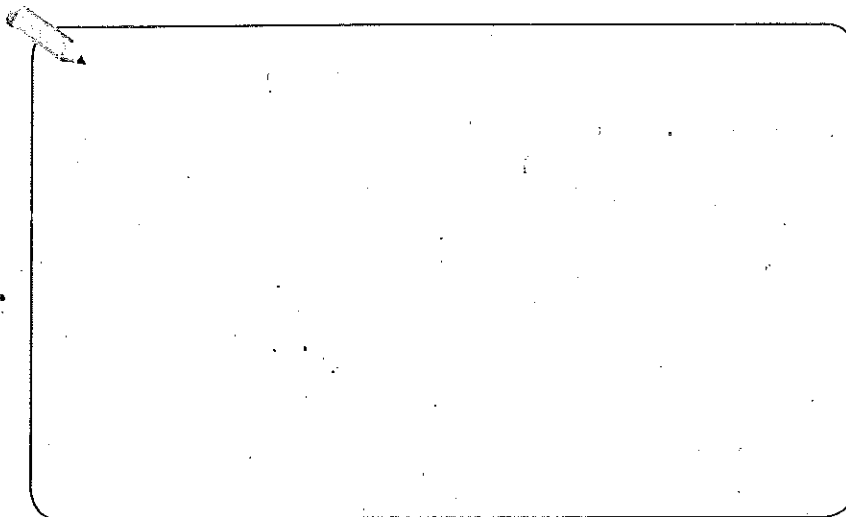
Draw a quick picture to show your work.



Name \_\_\_\_\_

# Share and Show

- Emily has 12 counters. She puts them in groups of 2. Draw a picture to show the number of groups.



## MATHEMATICAL PRACTICES

**Math Talk** Explain how you find the number of equal groups when you divide.

Draw counters on your MathBoard. Then circle equal groups. Complete the table.

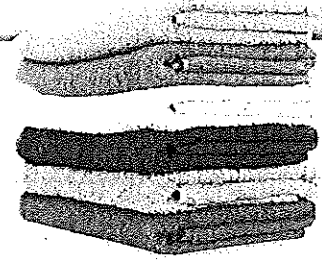
	Counters	Number of Equal Groups	Number in Each Group
✓ 2.	20		4
✓ 3.	24		3
4.	18		2

## On Your Own .....

Draw counters on your MathBoard. Then circle equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
5.	16		8
6.	25		5
7.	27		9
8.	32		4

**UNLOCK the Problem** REAL WORLD



9. A store has 24 beach towels in stacks of 6 towels each. How many stacks of beach towels are at the store?

a. What do you need to find? \_\_\_\_\_

b. How will you use what you know about making equal groups to solve the problem? \_\_\_\_\_

c. Draw equal groups to find how many stacks of beach towels there are at the store.

d. Complete the sentences.

The store has \_\_\_\_\_ beach towels.

There are \_\_\_\_\_ towels in each stack.

So, there are \_\_\_\_\_ stacks of beach towels at the store.

10. Some friends share 35 beach toys equally. If each friend gets 5 beach toys, how many friends are there?

11. ✖ Test Prep Dan's train is 27 inches long. If each train car is 3 inches long, how many train cars are there?

(A) 9

(C) 7

(B) 8

(D) 6

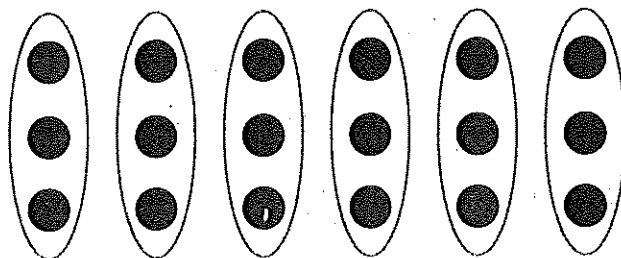
Name \_\_\_\_\_

## Number of Equal Groups

Complete the table. Use counters to help find the number of equal groups.

Counters	Number of Equal Groups	Number in Each Group
18		3

The number of equal groups is unknown, so divide.  
Circle groups of 3 counters until all 18 counters are in a group.



There are 6 groups of 3 counters each.

Draw counters. Then circle equal groups.  
Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
1.	24		4
2.	20		5
3.	21		7
4.	36		4

Name \_\_\_\_\_

## Eggs in One Basket

For each of the following recipes, tell how many batches can be made using 24 eggs. Draw a quick picture with counters to solve each problem.

1. A custard recipe calls for 8 eggs.      2. An omelet recipe calls for 3 eggs.

\_\_\_\_\_

3. A muffin recipe calls for 2 eggs.

\_\_\_\_\_

4. A French toast recipe calls for 12 eggs.

\_\_\_\_\_

5. **Stretch Your Thinking** If one batch of cookies calls for 5 eggs, how many batches can you make with 24 eggs? Will there be any eggs left over? **Explain.**

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Name \_\_\_\_\_

## Number of Equal Groups

COMMON CORE STANDARD CC.3.OA.2

Represent and solve problems involving multiplication and division.

Draw counters on your MathBoard. Then circle equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
1.	24	3	8
2.	35		7
3.	30		5
4.	16		4
5.	12		6
6.	36		9
7.	18		3
8.	15		5
9.	28		4
10.	27		3

## Problem Solving



11. In his bookstore, Toby places 21 books on shelves, with 7 books on each shelf. How many shelves does Toby need?

12. Mr. Holden has 32 quarters in stacks of 4 on his desk. How many stacks of quarters are on his desk?

\_\_\_\_\_

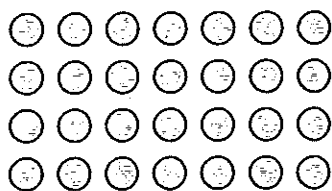
\_\_\_\_\_

**Lesson Check** (CC.3.OA.2)

1. Ramon works at a clothing store. He puts 24 pairs of jeans into stacks of 8. How many stacks does Ramon make?
  - (A) 5
  - (B) 4
  - (C) 3
  - (D) 2
2. There are 36 people waiting in line for a hay ride. Only 6 people can ride on each wagon. If each wagon is full, how many wagons are needed for all 36 people?
  - (A) 5
  - (B) 6
  - (C) 7
  - (D) 8

**Spiral Review** (CC.3.OA.3, CC.3.OA.8, CC.3.OA.9, CC.NBT.3)

3. Which multiplication sentence does the array show? (Lesson 3.5)
4. Austin buys 4 boxes of nails for his project. There are 30 nails in each box. How many nails does Austin buy in all? (Lesson 5.4)



- (A)  $4 \times 5 = 20$     (C)  $4 \times 7 = 28$
  - (B)  $4 \times 6 = 24$     (D)  $4 \times 8 = 32$
5. Which describes the number sentence? (Lesson 1.1)
 

$8 + 0 = 8$

    - (A) odd + odd = odd
    - (B) Identity Property of Addition
    - (C) even + even = even
    - (D) Commutative Property of Addition
  6. Each month for 6 months, Kelsey completes 5 paintings. How many more paintings does she need to complete before she has completed 38 paintings? (Lesson 4.10)
    - (A) 2                      (C) 8
    - (B) 6                      (D) 9

Name \_\_\_\_\_

## Model with Bar Models

**Essential Question** How can you use bar models to solve division problems?

COMMON CORE STANDARD CC.3.OA.2

Represent and solve problems involving multiplication and division.

### UNLOCK the Problem REAL WORLD

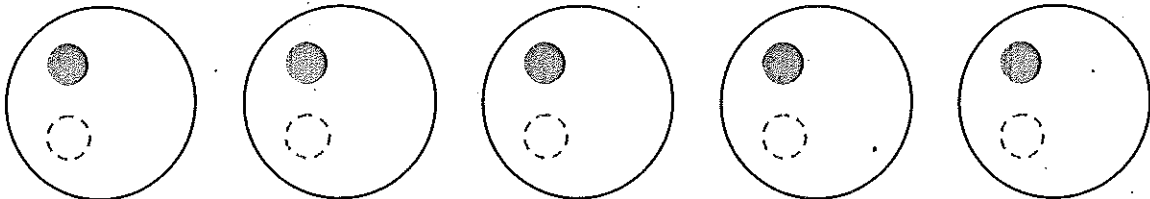
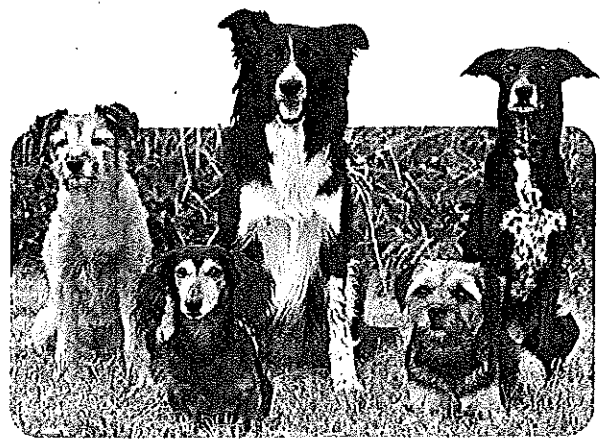
A dog trainer has 20 dog treats for 5 dogs in his class. If each dog gets the same number of treats, how many treats will each dog get?

• What do you need to find?

**Activity 1** Use counters to find how many in each group.

**Materials** ■ counters ■ MathBoard

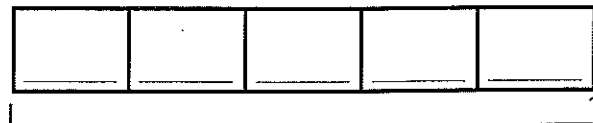
- Use 20 counters.
- Draw 5 circles on your MathBoard.
- Place 1 counter at a time in each circle until all 20 counters are used.
- Draw the rest of the counters to show your work.



There are \_\_\_\_ counters in each of the 5 groups.

A bar model can show how the parts of a problem are related.

- Complete the bar model to show 20 dog treats divided into 5 equal groups.



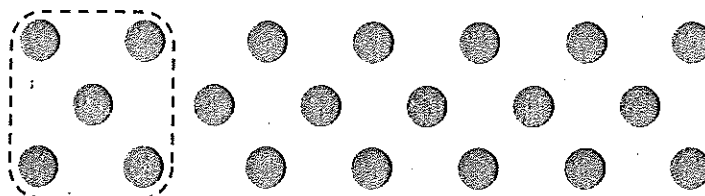
20 dog treats

So, each dog will get \_\_\_\_ treats.

## Activity 2 Draw to find how many equal groups.

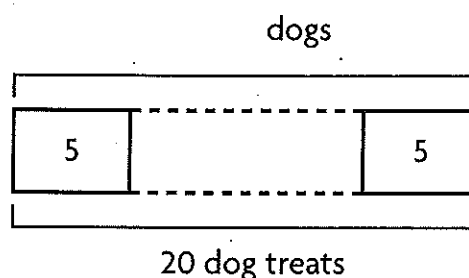
A dog trainer has 20 dog treats. If he gives 5 treats to each dog in his class, how many dogs are in the class?

- Look at the 20 counters.
- Circle a group of 5 counters.
- Continue circling groups of 5 until all 20 counters are in groups.



There are \_\_\_\_\_ groups of 5 counters.

- Complete the bar model to show 20 treats divided into groups of 5 treats.



So, there are \_\_\_\_\_ dogs in the class.

Here are two ways to record division.

Write:  $20 \div 5 = 4$

$\uparrow$        $\uparrow$        $\uparrow$   
 dividend divisor quotient

divisor  $\rightarrow 5 \overline{)20}$   $4 \leftarrow$  quotient

$\uparrow$   
 dividend

Read: Twenty divided by five equals four.

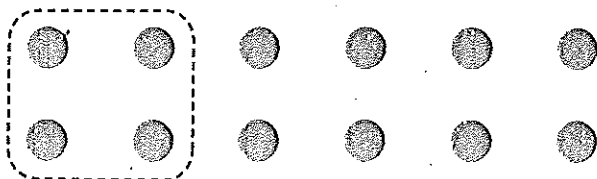
### Math Talk

Describe how you solved the problem. Use the terms *dividend*, *divisor*, and *quotient* in your explanation.

## Share and Show



1. Complete the picture to find  $12 \div 4$ . \_\_\_\_\_



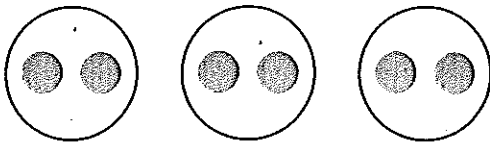
### Math Talk

Explain how you know how many groups to make.

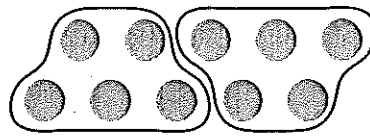
Name \_\_\_\_\_

Write a division equation for the picture.

✓ 2.



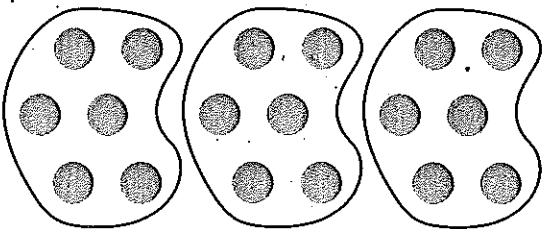
✓ 3.



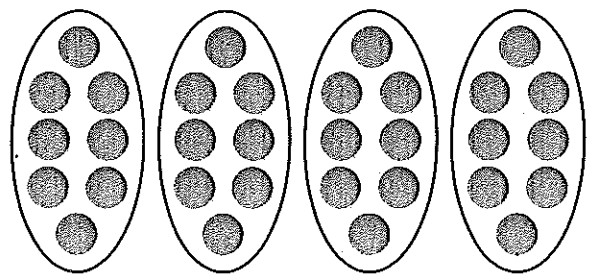
## On Your Own

Write a division equation for the picture.

4.



5.



**Practice: Copy and Solve** Make equal groups to find the quotient. Draw a quick picture to show your work.

6.  $20 \div 2$

7.  $27 \div 9$

8.  $20 \div 5$

9.  $18 \div 3$

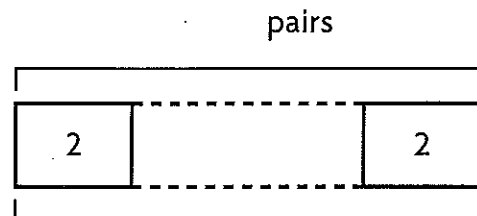
Complete the bar model to solve. Then write a division equation for the bar model.

10. There are 24 books in 4 equal stacks. How many books are in each stack?



24 books

11. There are 8 matching socks. How many pairs of socks can you make?



8 socks

# Problem Solving REAL WORLD

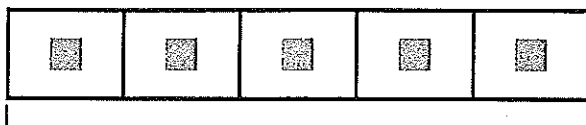
Use the table for 12–13.

12. Kevin bought a box of Puppy Chips for his dog. If he gives his dog 5 treats each day, for how many days will one box of treats last?

13. H.O.T. Pat bought one box of Chew Sticks to share equally between his 2 dogs. Mia bought one box of Chewies to share equally among her 5 dogs. How many more treats will each of Pat's dogs get than each of Mia's dogs? Explain.

14. **Write Math** Pose a Problem Write and solve a problem for  $42 \div 7$  in which the quotient is the number of groups.

15. ★ Test Prep Ed buys 5 bags of treats. He buys 15 treats in all. How many treats are in each bag?



15 treats

- (A) 2    (B) 3    (C) 4    (D) 5

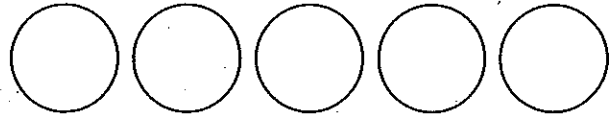
Dog Treats	
Type	Number in Box
Chew Sticks	14
Chewies	25
Dog Bites	30
Puppy Chips	45

SHOW YOUR WORK

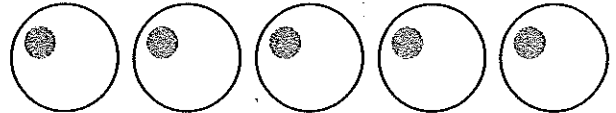
# Model with Bar Models

Use counters to find  $15 \div 5$ .

**Step 1** Use 15 counters. Draw 5 circles to show the number of equal groups.



**Step 2** Place 1 counter at a time in each circle.



**Step 3** Continue until you have placed all 15 counters.

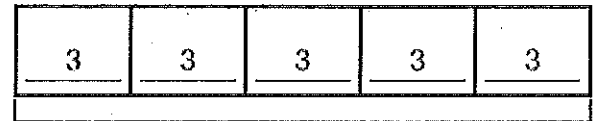


**Step 4** Count the number of counters in each circle.

There are 3 counters in each of the 5 groups.

You can use a bar model to show how the parts of a problem are related.

- There are 15 counters.
- There are 5 equal groups.
- There are 3 counters in each group.

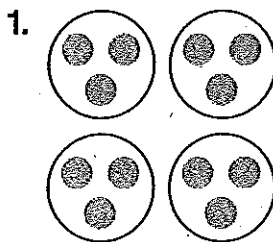


15 counters

Write a division equation for the model.

$$15 \div 5 = 3$$

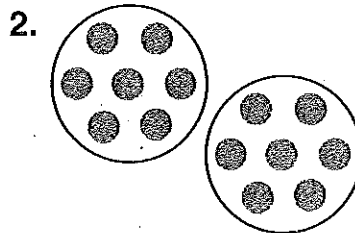
Write a division equation for the picture.




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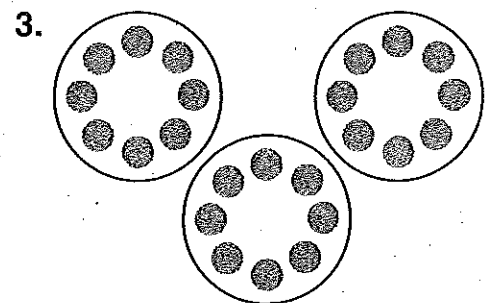
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Name \_\_\_\_\_

## Speedy Math

Solve each problem. For each exercise, the quotient has a matching letter. Place the letter above the exercise number to find the answer to the question.

1.  $20 \div 5 =$  \_\_\_\_\_

2.  $42 \div 7 =$  \_\_\_\_\_

3.  $25 \div 5 =$  \_\_\_\_\_

4.  $45 \div 9 =$  \_\_\_\_\_

5.  $36 \div 4 =$  \_\_\_\_\_

6.  $12 \div 6 =$  \_\_\_\_\_

7.  $48 \div 8 =$  \_\_\_\_\_

What is the fastest animal on land?

	A	B	C	E	H	I	R	T
KEY	2	3	4	5	6	7	8	9

\_\_\_\_\_

1.                      2.                      3.                      4.                      5.                      6.                      7.

8. **Stretch Your Thinking** Make up your own division exercises and puzzle to answer the question "What animal really likes carrots?" The answer is a "rabbit."

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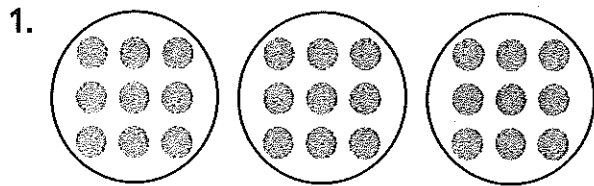
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# Model with Bar Models

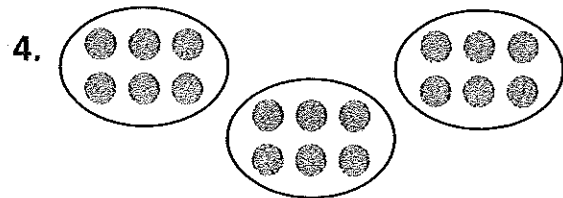
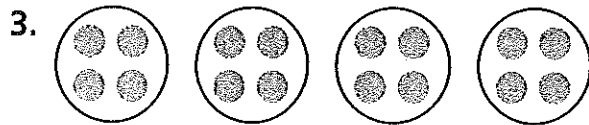
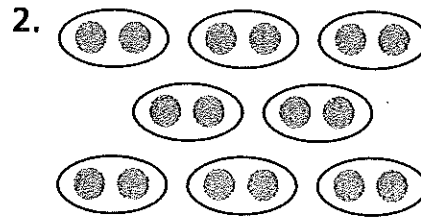
COMMON CORE STANDARD CC.3.OA.2

Represent and solve problems involving multiplication and division.

Write a division equation for the picture.



$$27 \div 3 = 9 \text{ or } 27 \div 9 = 3$$



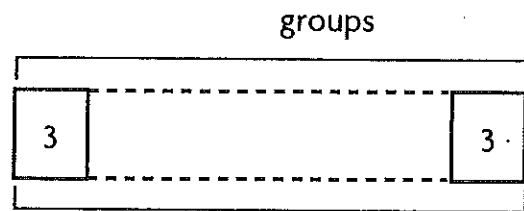
Complete the bar model to solve. Then write a division equation for the bar model.

5. There are 15 postcards in 3 equal stacks. How many postcards are in each stack?



15 postcards

6. There are 21 key rings. How many groups of 3 key rings can you make?



21 key rings

## Problem Solving

7. Jalyn collected 24 stones. She put them in 4 equal piles. How many stones are in each pile?

8. Tanner has 30 stickers. He puts 6 stickers on each page. On how many pages does he put stickers?

# **Lesson Check** (CC.3.OA.2)

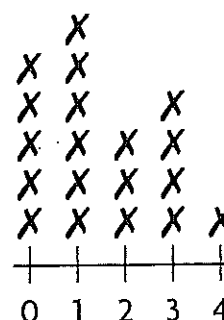
1. Jack and his little sister are stacking 24 blocks. They put the blocks in 3 equal stacks. How many blocks are in each stack?  
 (A) 4  
 (B) 6  
 (C) 7  
 (D) 8
2. Melissa made 45 greeting cards. She put them in 5 equal piles. How many cards did she put in each pile?  
 (A) 9  
 (B) 8  
 (C) 7  
 (D) 6

# **Spiral Review** (CC.3.OA.5, CC.3.OA.7, CC.3.MD.4)

3. Angie puts 1 stamp on each envelope. She puts stamps on 7 envelopes. How many stamps does Angie use? (Lesson 3.7)  
 (A) 0  
 (B) 1  
 (C) 7  
 (D) 8
4. A carnival ride has 8 cars. Each car holds 4 people. How many people are on the ride if all the cars are full? (Lesson 4.8)  
 (A) 34  
 (B) 32  
 (C) 28  
 (D) 24

Use the line plot for 5–6.

5. How many families have 1 computer at home? (Lesson 2.7)  
 (A) 4  
 (B) 5  
 (C) 6  
 (D) 7
6. How many families have more than 1 computer at home? (Lesson 2.7)  
 (A) 4  
 (B) 5  
 (C) 7  
 (D) 8



**Number of  
Computers at Home**

Name \_\_\_\_\_

# ALGEBRA

## Lesson 6.5

### Relate Subtraction and Division

**Essential Question** How is division related to subtraction?

COMMON CORE STANDARD CC.3.OA.3

Represent and solve problems involving multiplication and division.

### 1 UNLOCK the Problem REAL WORLD

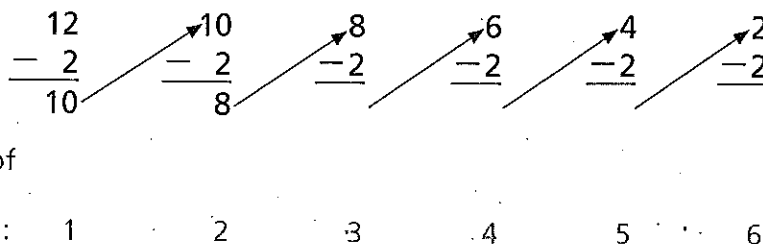
Serena and Mandy brought a total of 12 newspapers to school for the recycling program. Each girl brought in one newspaper each day. For how many days did the girls bring in newspapers?

• How many newspapers were brought in altogether?

• How many newspapers did the two girls bring in altogether each day?

### One Way Use repeated subtraction.

- Start with 12.
- Subtract 2 until you reach 0.
- Count the number of times you subtract 2.



Number of  
times you  
subtract 2:

Since you subtract 2 six times,  
there are \_\_\_\_\_ groups of 2 in 12.

So, Serena and Mandy brought in  
newspapers for \_\_\_\_\_ days.

Write:  $12 \div 2 = 6$  or  $2 \overline{)12}^6$

Read: Twelve divided by two equals six.



### ERROR Alert

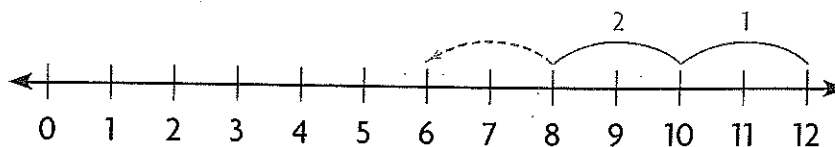
Be sure to keep subtracting 2 until you are unable to subtract 2 anymore.





## Another Way Count back on a number line.

- Start at 12.
- Count back by 2s as many times as you can. Draw the rest of the jumps on the number line.
- Count the number of times you jumped back 2.



You jumped back by 2 six times.

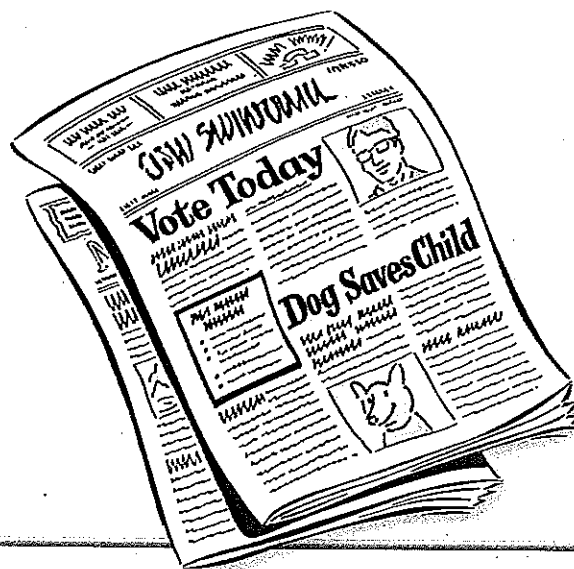
There are \_\_\_\_\_ jumps of 2 in 12.

$$12 \div 2 = \underline{\hspace{2cm}}$$

### MATHEMATICAL PRACTICES

#### Math Talk

Explain in your own words how you found the answer.

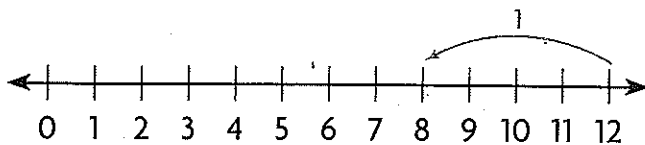


- What do your jumps of 2 represent? \_\_\_\_\_

## Share and Show



1. Draw the rest of the jumps on the number line to complete the division equation.  $12 \div 4 = \underline{\hspace{2cm}}$



### MATHEMATICAL PRACTICES

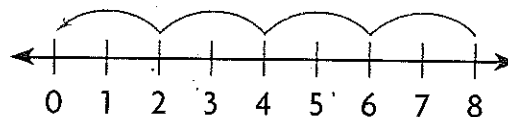
#### Math Talk

Explain how counting back on a number line is like using repeated subtraction.

Write a division equation.

2. 
$$\begin{array}{r} 10 \\ - 5 \\ \hline 5 \end{array}$$
 
$$\begin{array}{r} 5 \\ - 5 \\ \hline 0 \end{array}$$

3.

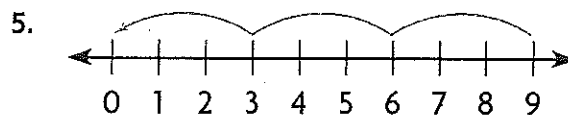


Name \_\_\_\_\_

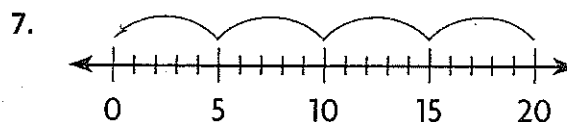
# On Your Own .....

Write a division equation.

4. 
$$\begin{array}{r} 28 \\ -7 \\ \hline 21 \end{array}$$
 
$$\begin{array}{r} 21 \\ -7 \\ \hline 14 \end{array}$$
 
$$\begin{array}{r} 14 \\ -7 \\ \hline 7 \end{array}$$
 
$$\begin{array}{r} 7 \\ -7 \\ \hline 0 \end{array}$$



6. 
$$\begin{array}{r} 24 \\ -8 \\ \hline 16 \end{array}$$
 
$$\begin{array}{r} 16 \\ -8 \\ \hline 8 \end{array}$$
 
$$\begin{array}{r} 8 \\ -8 \\ \hline 0 \end{array}$$



8. <sup>N.A.A.</sup><sub>H.O.T.</sub> Write a word problem that can be solved by using one of the division equations above.

Use repeated subtraction or a number line to solve.

9.  $18 \div 6 = \underline{\hspace{2cm}}$

10.  $14 \div 7 = \underline{\hspace{2cm}}$

11.  $9 \overline{)27}$

12.  $3 \overline{)24}$

# Problem Solving **REAL WORLD**

Use the graph for 13–15.

13. Matt puts his box tops in 2 equal piles.  
How many box tops are in each pile?

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14. **H.O.T.** Paige brought an equal number of box tops to school each day for 5 days. Alma also brought an equal number of box tops each day for 5 days. How many box tops did the two students bring in altogether each day? Explain.

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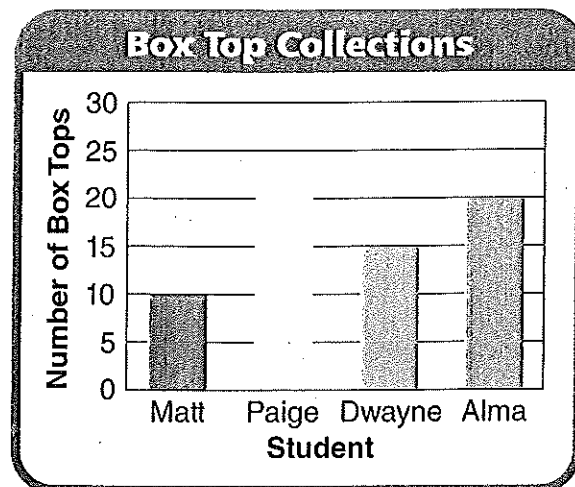
15. **Write Math** What's the Question?  
Dwayne puts all his box tops into bins.  
He puts an equal number in each bin.  
The answer is 5. What's the question?

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16. **Test Prep** Maya collected 7 box tops each day. She collected 21 box tops in all. For how many days did Maya collect box tops?

- (A) 2 days                      (C) 4 days  
(B) 3 days                      (D) 6 days



**SHOW YOUR WORK**

Name \_\_\_\_\_

# Algebra • Relate Subtraction and Division

Find  $18 \div 6$ .

**Step 1** Start with the number you are dividing, 18.

**Step 2** Subtract the number you are dividing by, 6.

**Step 3** There are more than 6 left. Subtract 6 again.

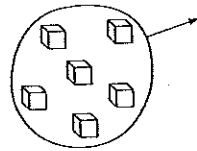
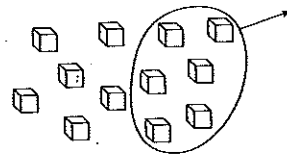
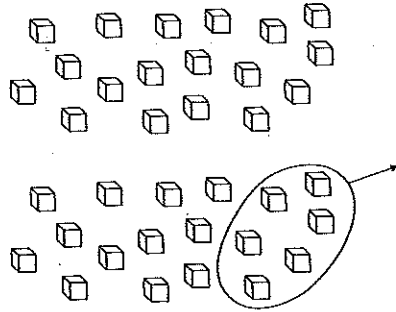
**Step 4** There are 6 left. Subtract 6 again.

**Step 5** Count the number of times you subtract 6.

You subtract 6 three times, so there are 3 groups of 6 in 18.

Write:  $18 \div 6 = 3$

Use base-ten blocks.



Use repeated subtraction.

$$\begin{array}{r} 18 \\ - 6 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 18 \\ - 6 \\ \hline 12 \end{array} \quad \begin{array}{r} 12 \\ - 6 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 18 \\ - 6 \\ \hline 12 \end{array} \quad \begin{array}{r} 12 \\ - 6 \\ \hline 6 \end{array} \quad \begin{array}{r} 6 \\ - 6 \\ \hline 0 \end{array}$$

Write a division equation.

1.  $\begin{array}{r} 27 \\ - 9 \\ \hline 18 \end{array} \quad \begin{array}{r} 18 \\ - 9 \\ \hline 9 \end{array} \quad \begin{array}{r} 9 \\ - 9 \\ \hline 0 \end{array}$

2.  $\begin{array}{r} 16 \\ - 4 \\ \hline 12 \end{array} \quad \begin{array}{r} 12 \\ - 4 \\ \hline 8 \end{array} \quad \begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array} \quad \begin{array}{r} 4 \\ - 4 \\ \hline 0 \end{array}$

Name \_\_\_\_\_

## Fish Tank Math

Jed works in a pet store that sells fish. He needs to move fish from the old tanks and put them in the new tanks. He can move the fish in small groups only.

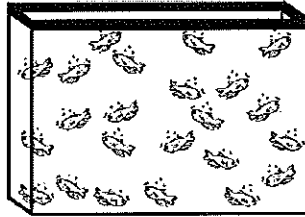
Use repeated subtraction to solve each problem. Circle groups of fish each time you subtract. Then write how many equal groups Jed can make and how many fish are left over.

1.  $19 \div 6$



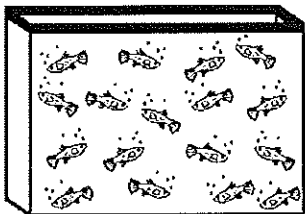
\_\_\_\_\_ groups and \_\_\_\_\_ left over

2.  $23 \div 5$



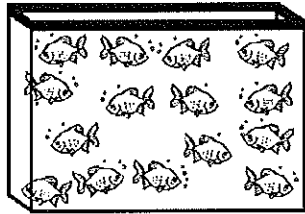
\_\_\_\_\_ groups and \_\_\_\_\_ left over

3.  $17 \div 3$



\_\_\_\_\_ groups and \_\_\_\_\_ left over

4.  $15 \div 4$



\_\_\_\_\_ groups and \_\_\_\_\_ left over

5. **Stretch Your Thinking** Choose one of the problems. Change the number of fish in each group so there will not be any fish left over. **Explain** why you chose that tank.

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Name \_\_\_\_\_

## Relate Subtraction and Division

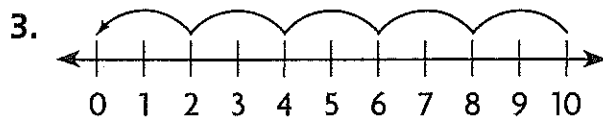
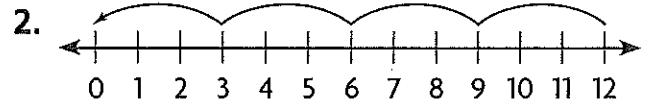
COMMON CORE STANDARD CC.3.OA.3

Represent and solve problems involving multiplication and division.

Write a division equation.

1. 
$$\begin{array}{r} 16 \\ - 4 \\ \hline 12 \end{array} \quad \begin{array}{r} 12 \\ - 4 \\ \hline 8 \end{array} \quad \begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array} \quad \begin{array}{r} 4 \\ - 4 \\ \hline 0 \end{array}$$

$$16 \div 4 = 4$$



4. 
$$\begin{array}{r} 20 \\ - 5 \\ \hline 15 \end{array} \quad \begin{array}{r} 15 \\ - 5 \\ \hline 10 \end{array} \quad \begin{array}{r} 10 \\ - 5 \\ \hline 5 \end{array} \quad \begin{array}{r} 5 \\ - 5 \\ \hline 0 \end{array}$$

Use repeated subtraction or a number line to solve.

5.  $28 \div 7 = \underline{\hspace{2cm}}$

6.  $18 \div 6 = \underline{\hspace{2cm}}$

7.  $8 \overline{)40}$

8.  $9 \overline{)36}$

## Problem Solving

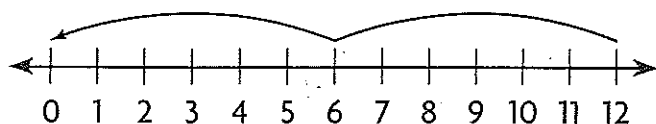


9. Mrs. Costa has 18 pencils. She gives 9 pencils to each of her children for school. How many children does Mrs. Costa have?

10. Boël decides to plant rose bushes in her garden. She has 24 bushes. She places 6 bushes in each row. How many rows of rose bushes does she plant in her garden?

# Lesson Check (CC.3.OA.3)

1. Which division equation is shown?



- (A)  $3 \times 4 = 12$  (C)  $12 \div 3 = 4$   
(B)  $12 \div 6 = 2$  (D)  $12 \div 4 = 3$

2. Isabella has 35 cups of dog food. She feeds her dogs 5 cups of food each day. For how many days will the dog food last?

- (A) 6 days (C) 8 days  
(B) 7 days (D) 9 days

# Spiral Review (CC.3.OA.3, CC.3.OA.8, CC.3.MD.3)

3. Ellen buys 4 bags of oranges. There are 6 oranges in each bag. How many oranges does Ellen buy?

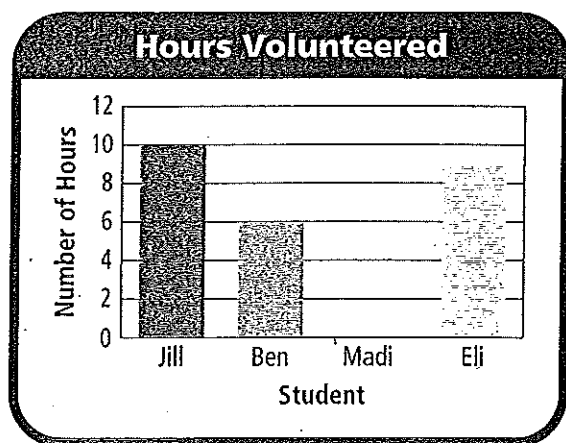
(Lesson 4.3)

- (A) 10 (C) 24  
(B) 12 (D) 30

4. Each month for 7 months, Samuel mows 3 lawns. How many more lawns does he need to mow before he has mowed 29 lawns? (Lesson 4.10)

- (A) 1 (C) 7  
(B) 3 (D) 8

Use the graph for 5–6.



5. How many hours did Eli volunteer?

(Lesson 2.4)

- (A) 4 hours (C) 9 hours  
(B) 8 hours (D) 10 hours

6. Madi volunteered 2 hours less than Jill. At what number should the bar for Madi end? (Lesson 2.5)

- (A) 3 (C) 8  
(B) 6 (D) 12

Name \_\_\_\_\_

# ✓ Mid-Chapter Checkpoint

## ► Vocabulary

Choose the best term from the box to complete the sentence.

1. You \_\_\_\_\_ when you separate into equal groups. (p. 213)

Vocabulary

divide

divisor

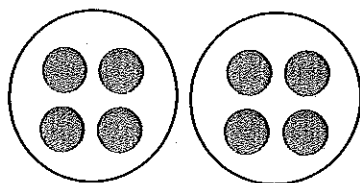
## ► Concepts and Skills

Use counters or draw a quick picture on your MathBoard. Make or circle equal groups. Complete the table. (CC.3.OA.2)

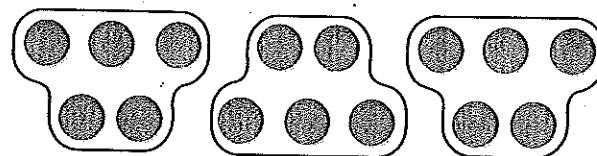
	Counters	Number of Equal Groups	Number in Each Group
2.	6	2	
3.	30		5
4.	28	7	

Write a division equation for the picture. (CC.3.OA.2)

5.



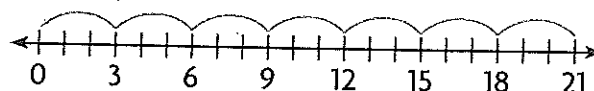
6.



Write a division equation. (CC.3.OA.3)

7. 
$$\begin{array}{r} 36 \\ - 9 \\ \hline 27 \end{array}$$
 
$$\begin{array}{r} 27 \\ - 9 \\ \hline 18 \end{array}$$
 
$$\begin{array}{r} 18 \\ - 9 \\ \hline 9 \end{array}$$
 
$$\begin{array}{r} 9 \\ - 9 \\ \hline 0 \end{array}$$

8.



Fill in the bubble for the correct answer choice.

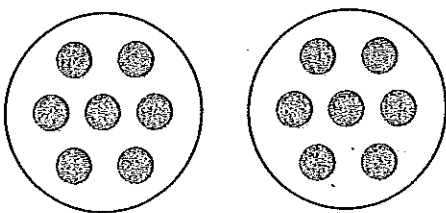
9. Adam plants 14 seeds in some flowerpots. If he puts 2 seeds in each pot, how many flowerpots does he use? (CC.3.OA.2)

(A) 7                      (C) 12  
(B) 8                      (D) 16

10. Desiree has 20 stickers. She gives the same number of stickers to each of 5 friends. Which equation can be used to find the number of stickers each friend receives? (CC.3.OA.3)

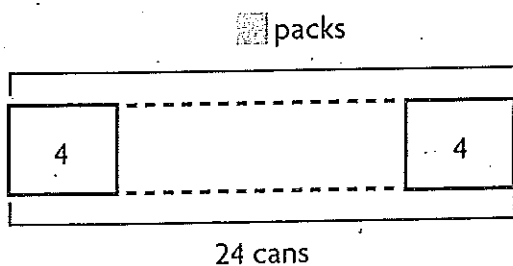
(A)  $20 + 5 = \square$   
(B)  $20 - 5 = \square$   
(C)  $20 \times 5 = \square$   
(D)  $20 \div 5 = \square$

11. Jayden modeled a division equation with some counters. Which division equation matches the model? (CC.3.OA.2)



(A)  $12 \div 2 = 6$                       (C)  $16 \div 2 = 8$   
(B)  $14 \div 2 = 7$                       (D)  $18 \div 2 = 9$

12. Lillian bought 24 cans of cat food. There were 4 cans in each pack. How many packs of cat food did Lillian buy? (CC.3.OA.2)



(A) 5                      (B) 6                      (C) 7                      (D) 8

# Mid-Chapter checkpoint

LESSONS 6.1 TO 6.5

## Formative Assessment

The Mid-Chapter Checkpoint to assess students' learning and progress during the first half of the chapter. The formative assessment provides an opportunity to adjust teaching strategies for individual or whole class instruction.

Name \_\_\_\_\_

### Mid-Chapter Checkpoint

#### Vocabulary

Choose the best term from the box to complete the sentence.

1. You divide when you separate into equal groups. (p. 213)

#### Vocabulary

divide

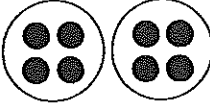
divisor

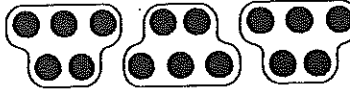
#### Concepts and Skills

Use counters or draw a quick picture on your MathBoard. Make or circle equal groups. Complete the table. (CC.3.OA.2)

	Counters	Number of Equal Groups	Number in Each Group
2.	6	2	3
3.	30	6	5
4.	28	7	4

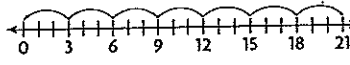
Write a division equation for the picture. (CC.3.OA.2)

5.   
 $8 \div 2 = 4$  or  $8 \div 4 = 2$

6.   
 $15 \div 5 = 3$  or  $15 \div 3 = 5$

Write a division equation. (CC.3.OA.3)

7. 
$$\begin{array}{r} 36 \\ -9 \\ \hline 27 \end{array}$$
 
$$\begin{array}{r} 27 \\ -9 \\ \hline 18 \end{array}$$
 
$$\begin{array}{r} 18 \\ -9 \\ \hline 9 \end{array}$$
 
$$\begin{array}{r} 9 \\ -9 \\ \hline 0 \end{array}$$
  
 $36 \div 9 = 4$

8.   
 $21 \div 3 = 7$

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Chapter 6 229

## Data-Driven Decision Making

Based on the results of the Mid-Chapter Checkpoint, use the following resources to strengthen individual or whole class instruction.

Item	Lesson	CCSS	Common Error	Intervene With	Soar to Success Math
2-4	6.2, 6.3	CC.3.OA.2	May confuse the number of equal groups and the number in each group	R—6.2, 6.3; TE—pp. 213B, 217B	13.02, 13.22
5	6.4	CC.3.OA.2	May miscount the number of counters in each group	R—6.4; TE—p. 221B	13.23
7, 8	6.5	CC.3.OA.3	May write the division equation incorrectly	R—6.5; TE—p. 225B	13.10

CCSS—Common Core State Standards

Key: R—Reteach Book; TE—RtI Activities

Fill in the bubble for the correct answer choice.



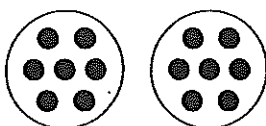
9. Adam plants 14 seeds in some flowerpots. If he puts 2 seeds in each pot, how many flowerpots does he use? (CC.3.OA.2)

☐ A 7      ☐ C 12  
☐ B 8      ☐ D 16

10. Desiree has 20 stickers. She gives the same number of stickers to each of 5 friends. Which equation can be used to find the number of stickers each friend receives? (CC.3.OA.3)

☐ A  $20 + 5 =$  ☐  
☐ B  $20 - 5 =$  ☐  
☐ C  $20 \times 5 =$  ☐  
☒ D  $20 \div 5 =$  ☐

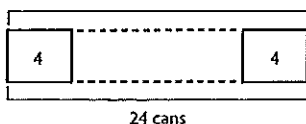
11. Jayden modeled a division equation with some counters. Which division equation matches the model? (CC.3.OA.2)



☐ A  $12 \div 2 = 6$       ☐ C  $16 \div 2 = 8$   
☒ B  $14 \div 2 = 7$       ☐ D  $18 \div 2 = 9$

12. Lillian bought 24 cans of cat food. There were 4 cans in each pack. How many packs of cat food did Lillian buy? (CC.3.OA.2)

☐ packs



☐ A 5      ☒ B 6      ☐ C 7      ☐ D 8



## Data-Driven Decision Making



RtI

Item	Lesson	CCSS	Common Error	Intervene With	Soa Success
9	6.3	CC.3.OA.2	May count the number of groups formed incorrectly	R—6.3; TE—p. 217B	13.
10	6.5	CC.3.OA.3	May choose the wrong operation	R—6.5; TE—p. 225B	13.
11	6.4	CC.3.OA.2	May miscount the number of counters in each group	R—6.4; TE—p. 221B	13.
12	6.4	CC.3.OA.2	May use the bar model incorrectly	R—6.4; TE—p. 221B	13.

Name \_\_\_\_\_

## Model with Arrays

**Essential Question** How can you use arrays to solve division problems?

COMMON CORE STANDARD CC.3.OA.3

Represent and solve problems involving multiplication and division.

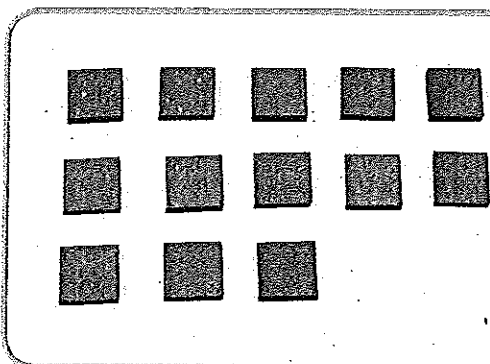
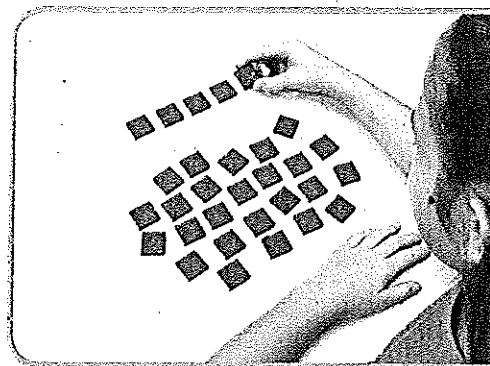
### Investigate

**Materials** ■ square tiles

You can use arrays to model division and find equal groups.

- Count out 30 tiles. Make an array to find how many rows of 5 are in 30.
- Make a row of 5 tiles.
- Continue to make as many rows of 5 tiles as you can.

How many rows of 5 did you make? \_\_\_\_\_



### Draw Conclusions .....

- Explain how you used the tiles to find the number of rows of 5 in 30.

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- What multiplication equation could you write for the array? Explain.

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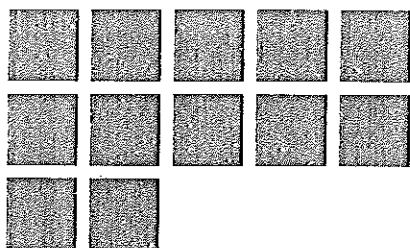
- Apply** Tell how to use an array to find how many rows of 6 are in 30.

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## Make Connections .....

You can write a division equation to show how many rows of 5 are in 30. Show the array you made in Investigate by completing the drawing below.



### Math Idea

You can divide to find the number of equal rows or to find the number in each row.

$$30 \div 5 =$$

There are \_\_\_\_\_ rows of 5 tiles in 30.

So,  $30 \div 5 =$  \_\_\_\_\_.

### Try This!

Count out 24 tiles. Make an array with the same number of tiles in 4 rows. Place 1 tile in each of the 4 rows. Then continue placing 1 tile in each row until you use all the tiles. Draw your array below.



### MATHEMATICAL PRACTICES

**Math Talk** Explain how making an array helps you divide.

- How many tiles are in each row? \_\_\_\_\_
- What division equation can you write for your array? \_\_\_\_\_

Name \_\_\_\_\_

## Share and Show

Use square tiles to make an array. Solve.

1. How many rows of 3 are in 18?

\_\_\_\_\_

2. How many rows of 6 are in 12?

\_\_\_\_\_

3. How many rows of 7 are in 21?

\_\_\_\_\_

4. How many rows of 8 are in 32?

\_\_\_\_\_

Make an array. Then write a division equation.

5. 25 tiles in 5 rows

\_\_\_\_\_

6. 14 tiles in 2 rows

\_\_\_\_\_

7. 28 tiles in 4 rows

\_\_\_\_\_

8. 27 tiles in 9 rows

\_\_\_\_\_

9. How many rows of 3 are in 15?

\_\_\_\_\_

10. How many rows of 8 are in 24?

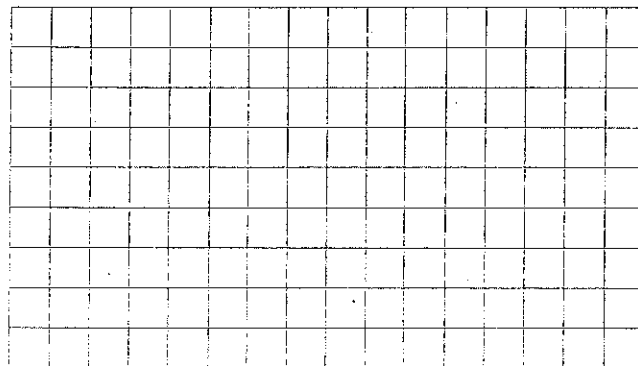
\_\_\_\_\_

### MATHEMATICAL PRACTICES

#### Math Talk

Explain when you count the number of rows to find the answer and when you count the number of tiles in each row to find the answer.

11. **Write Math** Show two ways you could make an array with tiles for  $18 \div 6$ . Shade squares on the grid to record the arrays.

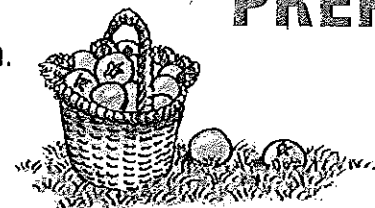


**UNLOCK the Problem**

**REAL WORLD**

**TEST PREP**

12. Thomas has 28 tomato seedlings to plant in his garden. He wants to plant 4 seedlings in each row. How many rows of tomato seedlings will Thomas plant?



(A) 5    (B) 6    (C) 7    (D) 8

a. What do you need to find? \_\_\_\_\_

b. What operation could you use to solve the problem? \_\_\_\_\_

c. Draw an array to find the number of rows of tomato seedlings.

d. What is another way you could have solved the problem?

\_\_\_\_\_  
\_\_\_\_\_

e. Complete the sentences.

Thomas has \_\_\_\_\_ tomato seedlings.

He wants to plant \_\_\_\_\_ seedlings in each \_\_\_\_\_.

So, Thomas will plant \_\_\_\_\_ rows of tomato seedlings.

f. Fill in the bubble for the correct answer choice above.

13. Faith plants 36 flowers in 6 equal rows. How many flowers are in each row?

(A) 42    (B) 30    (C) 7    (D) 6

14. There were 20 plants sold at a store on Saturday. Customers bought 5 plants each. How many customers bought the plants?

(A) 3    (B) 4    (C) 5    (D) 6

## Model with Arrays

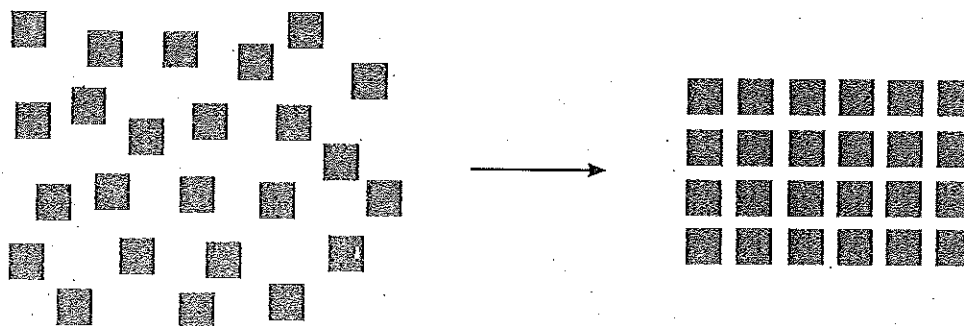
You can use arrays to model division.

How many rows of 6 tiles each can you make with 24 tiles?

**Use square tiles to make an array. Solve.**

**Step 1** Use 24 tiles.

**Step 2** Make as many rows of 6 as you can.



You can make 4 rows of 6.

So, there are 4 rows of 6 tiles in 24.

**Use square tiles to make an array. Solve.**

1. How many rows of 7 are in 28?

2. How many rows of 5 are in 15?

\_\_\_\_\_

\_\_\_\_\_

**Make an array. Then write a division equation.**

3. 18 tiles in 3 rows

4. 20 tiles in 4 rows

\_\_\_\_\_

\_\_\_\_\_

5. 14 tiles in 2 rows

6. 36 tiles in 4 rows

\_\_\_\_\_


\_\_\_\_\_

Name \_\_\_\_\_

## Array Puzzles

Use the clues to help solve the puzzle. You can use tiles or draw the array on a separate sheet of paper.

- |   |   |
|---|---|
| <p>1. I am an array made with 24 tiles. I have 8 tiles in each row. How many rows do I have?</p> <p>_____</p>   | <p>2. I am an array with 4 equal rows. I have 16 tiles in all. How many tiles are in each of my rows?</p> <p>_____</p>  |
| <p>3. I am a square-shaped array. I have 7 rows. How many tiles do I have in all? (Hint: A square has 4 sides of equal length.)</p> <p>_____</p>                              | <p>4. I am an array made with 24 tiles. My number of rows is 2 more than the number of tiles in each of my rows. How many rows do I have?</p> <p>_____</p>  |
| <p>5. I am an array with 7 tiles in each row. My number of rows is 4 less than the number of tiles in each of my rows. How many tiles am I made with in all?</p> <p>_____</p> | <p>6. I am an array made with 40 tiles. I have an odd number of rows and an even number of tiles in each of my rows. The number of my rows plus the number of tiles in each of my rows equals 13. How many rows do I have?</p> <p>_____</p> |

7.  **Write Math** Write your own array puzzle. Include the answer.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_

## Lesson 6.6

### Model with Arrays

COMMON CORE STANDARD CC.3.OA.3

Represent and solve problems involving multiplication and division.

Use square tiles to make an array. Solve.

1. How many rows of 4 are in 12?

3 rows

2. How many rows of 3 are in 21?

\_\_\_\_\_

3. How many rows of 6 are in 30?

\_\_\_\_\_

4. How many rows of 9 are in 18?

\_\_\_\_\_

Make an array. Then write a division equation.

5. 20 tiles in 5 rows

\_\_\_\_\_

6. 28 tiles in 7 rows

\_\_\_\_\_

7. 18 tiles in 9 rows

\_\_\_\_\_

8. 36 tiles in 6 rows

\_\_\_\_\_

### Problem Solving



9. A dressmaker has 24 buttons. He needs 3 buttons to make one dress. How many dresses can he make with 24 buttons?

\_\_\_\_\_

10. Liana buys 36 party favors for her 9 guests. She gives an equal number of favors to each guest. How many party favors does each guest get?

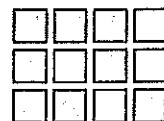
\_\_\_\_\_

**Lesson Check** (CC.3.OA.3)

1. Mr. Canton places 24 desks in 6 equal rows. How many desks are in each row?

(A) 2  
(B) 3  
(C) 4  
(D) 5

2. Which division equation is shown by the array?



(A)  $12 \div 6 = 2$  (C)  $12 \div 2 = 6$   
(B)  $12 \div 3 = 4$  (D)  $12 \div 1 = 12$

**Spiral Review** (CC.3.OA.1, CC.OA.4, CC.3.OA.5, CC.3.OA.7)

3. Amy has 2 rows of 4 sports trophies on each of her 3 shelves. How many sports trophies does Amy have in all? (Lesson 4.6)

(A) 8  
(B) 9  
(C) 12  
(D) 24

4. What is the unknown factor?

(Lesson 5.2)

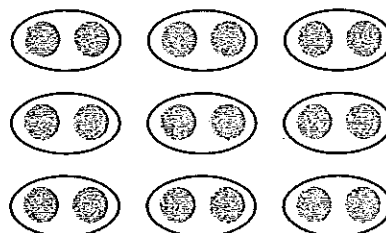
$$9 \times p = 45$$

(A) 4  
(B) 5  
(C) 6  
(D) 7

5. Sam has 7 stacks with 4 quarters each. How many quarters does Sam have? (Lesson 4.5)

(A) 11  
(B) 12  
(C) 24  
(D) 28

6. How can you skip count to find how many counters in all? (Lesson 3.1)



(A) 3 groups of 2  
(B) 3 groups of 3  
(C) 9 groups of 2  
(D) 18 groups of 2

Name \_\_\_\_\_

# ALGEBRA

## Lesson 6.7

### Relate Multiplication and Division

**Essential Question** How can you use multiplication to divide?

COMMON CORE STANDARD CC.3.OA.6

Understand properties of multiplication and the relationship between multiplication and division.

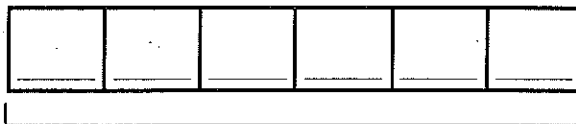
### UNLOCK the Problem REAL WORLD

Pam went to the fair. She went on the same ride 6 times and used the same number of tickets each time. She used 18 tickets. How many tickets did she use each time she went on the ride?

**One Way** Use bar models.

You can use bar models to understand how multiplication and division are related.

Complete the bar model to show 18 tickets divided into 6 equal groups.



18 tickets

Write:  $18 \div 6 =$  \_\_\_\_\_

So, Pam used \_\_\_\_\_ tickets each time she went on the ride.

Multiplication and division are opposite operations, or **inverse operations**.

You can think about multiplication to solve a division problem.

To solve  $18 \div 6 =$  , think  $6 \times$  = 18.

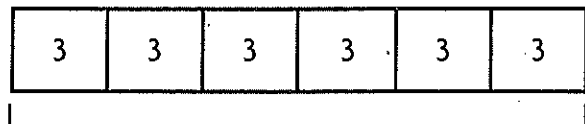
Since  $6 \times 3 = 18$ , then  $18 \div 6 = 3$ .

• What do you need to find?

• Circle the numbers you need to use.

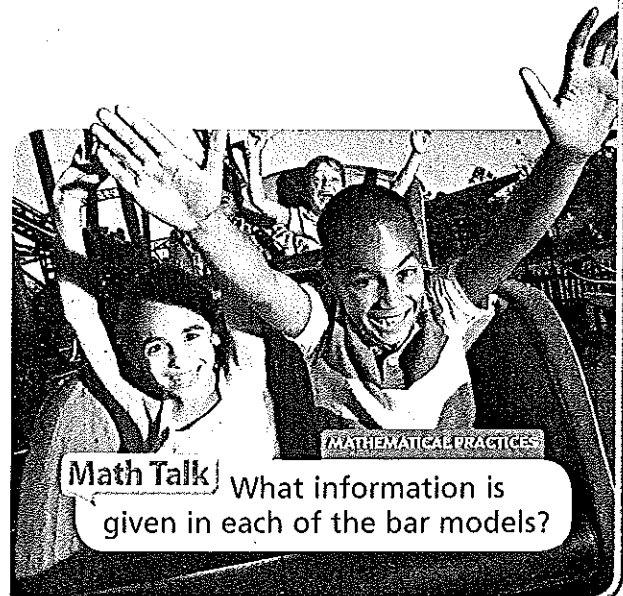
What if the problem said Pam went on the ride 6 times and used 3 tickets each time? How many tickets did Pam use in all?

Complete the bar model to show 6 groups of 3 tickets.



tickets

Write:  $6 \times 3 =$  \_\_\_\_\_



MATHEMATICAL PRACTICES

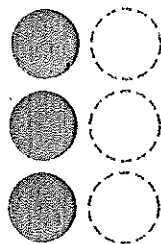
**Math Talk** What information is given in each of the bar models?



## Another Way Use an array.

You can use an array to see how multiplication and division are related.

Show an array with 18 counters in 3 equal rows by completing the drawing.



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

Write:  $18 \div 3 = \underline{\hspace{2cm}}$

The same array can be used to find the total number if you know there are 3 rows with 6 counters in each row.

Write:  $3 \times 6 = \underline{\hspace{2cm}}$

## Share and Show



1. Use the array to complete the equation.

Think: There are 3 counters in each row.

$$6 \div 2 = \underline{\hspace{2cm}}$$

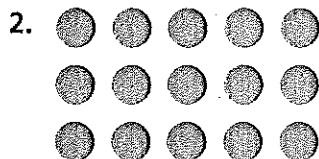


### MATHEMATICAL PRACTICES

#### Math Talk

Describe another way to find the quotient for  $6 \div 2$ .

### Complete.



$$3 \text{ rows of } \underline{\hspace{1cm}} = 15$$

$$3 \times \underline{\hspace{1cm}} = 15$$

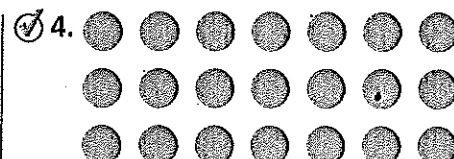
$$15 \div 3 = \underline{\hspace{2cm}}$$



$$2 \text{ rows of } \underline{\hspace{1cm}} = 12$$

$$2 \times \underline{\hspace{1cm}} = 12$$

$$12 \div 2 = \underline{\hspace{2cm}}$$



$$3 \text{ rows of } \underline{\hspace{1cm}} = 21$$

$$3 \times \underline{\hspace{1cm}} = 21$$

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

### Complete the equations.

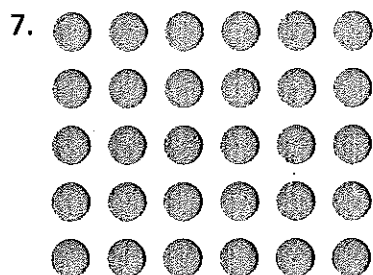
$$5. \quad 5 \times \underline{\hspace{1cm}} = 40 \quad 40 \div 5 = \underline{\hspace{2cm}}$$

$$6. \quad 6 \times \underline{\hspace{1cm}} = 18 \quad 18 \div 6 = \underline{\hspace{2cm}}$$

Name \_\_\_\_\_

## On Your Own .....

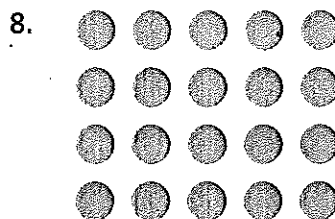
Complete.



$$5 \text{ rows of } \underline{\hspace{2cm}} = 30$$

$$5 \times \underline{\hspace{2cm}} = 30$$

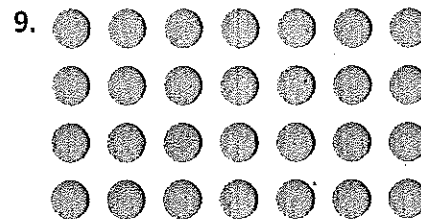
$$30 \div 5 = \underline{\hspace{2cm}}$$



$$4 \text{ rows of } \underline{\hspace{2cm}} = 20$$

$$4 \times \underline{\hspace{2cm}} = 20$$

$$20 \div 4 = \underline{\hspace{2cm}}$$



$$4 \text{ rows of } \underline{\hspace{2cm}} = 28$$

$$4 \times \underline{\hspace{2cm}} = 28$$


$$28 \div 4 = \underline{\hspace{2cm}}$$

Complete the equations.

10.  $7 \times \underline{\hspace{2cm}} = 21$      $21 \div 7 = \underline{\hspace{2cm}}$     11.  $8 \times \underline{\hspace{2cm}} = 16$      $16 \div 8 = \underline{\hspace{2cm}}$

12.  $4 \times \underline{\hspace{2cm}} = 32$      $32 \div 4 = \underline{\hspace{2cm}}$     13.  $6 \times \underline{\hspace{2cm}} = 24$      $24 \div 6 = \underline{\hspace{2cm}}$

14.  $9 \times \underline{\hspace{2cm}} = 18$      $18 \div 9 = \underline{\hspace{2cm}}$     15.  $5 \times \underline{\hspace{2cm}} = 25$      $25 \div 5 = \underline{\hspace{2cm}}$

 **H.O.T. Algebra Complete.**

16.  $3 \times 3 = 27 \div \underline{\hspace{2cm}}$

17.  $16 \div 2 = \underline{\hspace{2cm}} \times 2$

18.  $9 = \underline{\hspace{2cm}} \div 4$

19.  $5 = \underline{\hspace{2cm}} \div 7$

20.  $42 \div 7 = \underline{\hspace{2cm}} \times 2$

21.  $30 \div \underline{\hspace{2cm}} = 2 \times 3$

# Problem Solving **REAL WORLD**

Use the table for 22–23.

22. Mr. Jerome paid \$24 for some students to get into the fair. How many students did Mr. Jerome pay for?

23. **Hot** Garrett is 8 years old. He and his family are going to the county fair. What is the price of admission for Garrett, his 2 parents, and baby sister?

24. There are 20 seats on the Wildcat ride. The number of seats in each car is the same. If there are 5 cars on the ride, how many seats are there in each car? Complete the bar model to show the problem. Then answer the question.


--	--	--	--	--

20 seats

25. **Write Math** Pose a Problem How many days are there in 2 weeks? Write and solve a related word problem to represent the inverse operation.

26. **Test Prep** There are 35 prizes in 5 equal rows. How many prizes are in each row?

(A) 6 (B) 7 (C) 8 (D) 9



**Cochise County Fair**

Price of Admission	
Adults	\$6
Students	\$3
Children 5 and under free	

SHOW YOUR WORK


Name \_\_\_\_\_

# Algebra • Relate Multiplication and Division

You can use an array to complete  $21 \div 3 = \underline{\hspace{2cm}}$ .

Use 21 counters.

Make 3 equal rows.

 There are 7 counters in each row.

 3 rows of 7 = 21

 So,  $21 \div 3 = 7$

The 21 tells the total number of counters in the array.

The 3 stands for the number of equal rows.

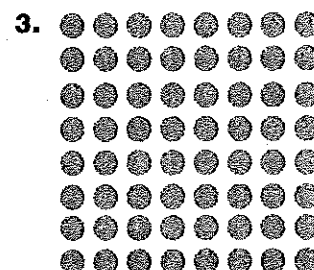
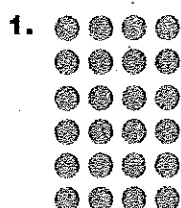
The 7 stands for the number of counters in each row.

You can use a related multiplication fact to check your answer.

$$21 \div 3 = 7 \quad 3 \times 7 = 21$$

So, 3 rows of 7 represents  $21 \div 3 = 7$  or  $3 \times 7 = 21$ .

**Complete.**



6 rows of  $\underline{\hspace{2cm}}$  = 24

3 rows of  $\underline{\hspace{2cm}}$  = 27

8 rows of  $\underline{\hspace{2cm}}$  = 64

$6 \times \underline{\hspace{2cm}}$  = 24

$3 \times \underline{\hspace{2cm}}$  = 27

$8 \times \underline{\hspace{2cm}}$  = 64

$24 \div 6 = \underline{\hspace{2cm}}$

$27 \div 3 = \underline{\hspace{2cm}}$

$64 \div 8 = \underline{\hspace{2cm}}$

**Complete the equations.**

4.  $6 \times \underline{\hspace{2cm}} = 42$      $42 \div \underline{\hspace{2cm}} = 6$

5.  $9 \times \underline{\hspace{2cm}} = 54$      $54 \div \underline{\hspace{2cm}} = 9$

## Multiplication and Division Match

Solve. Then draw a line to match each multiplication equation to a related division equation.

1.  $2 \times 8 = \underline{\hspace{2cm}}$  •

A  $12 \div 2 = 6$

2.  $5 \times 8 = \underline{\hspace{2cm}}$  •

B  $42 \div 7 = 6$

3.  $3 \times 9 = \underline{\hspace{2cm}}$  •

C  $18 \div 3 = 6$

4.  $6 \times 7 = \underline{\hspace{2cm}}$  •

D  $40 \div 8 = 5$

5.  $2 \times 6 = \underline{\hspace{2cm}}$  •

E  $24 \div 6 = 4$

6.  $5 \times 7 = \underline{\hspace{2cm}}$  •

F  $27 \div 9 = 3$

7.  $6 \times 4 = \underline{\hspace{2cm}}$  •

G  $24 \div 3 = 8$

8.  $8 \times 8 = \underline{\hspace{2cm}}$  •

H  $36 \div 9 = 4$

9.  $3 \times 6 = \underline{\hspace{2cm}}$  •

I  $16 \div 2 = 8$

10.  $9 \times 4 = \underline{\hspace{2cm}}$  •

J  $18 \div 2 = 9$

11.  $9 \times 2 = \underline{\hspace{2cm}}$  •

K  $64 \div 8 = 8$

12.  $8 \times 3 = \underline{\hspace{2cm}}$  •

L  $35 \div 5 = 7$

Name \_\_\_\_\_

# ALGEBRA

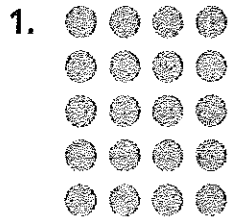
## Lesson 6.7

### Relate Multiplication and Division

COMMON CORE STANDARD CC.3.OA.6

Understand properties of multiplication and the relationship between multiplication and division.

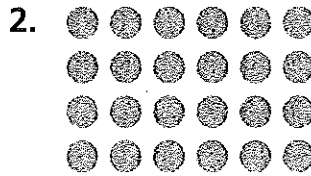
Complete the equations.



$$5 \text{ rows of } \underline{4} = 20$$

$$5 \times \underline{4} = 20$$

$$20 \div 5 = \underline{4}$$



$$4 \text{ rows of } \underline{\quad} = 24$$

$$4 \times \underline{\quad} = 24$$

$$24 \div 4 = \underline{\quad}$$



$$3 \text{ rows of } \underline{\quad} = 24$$

$$3 \times \underline{\quad} = 24$$

$$24 \div 3 = \underline{\quad}$$

Complete the equations.

4.  $4 \times \underline{\quad} = 28$      $28 \div 4 = \underline{\quad}$

5.  $6 \times \underline{\quad} = 36$      $36 \div 6 = \underline{\quad}$

6.  $7 \times \underline{\quad} = 35$      $35 \div 7 = \underline{\quad}$

7.  $7 \times \underline{\quad} = 21$      $21 \div 7 = \underline{\quad}$

8.  $9 \times \underline{\quad} = 27$      $27 \div 9 = \underline{\quad}$

9.  $2 \times \underline{\quad} = 16$      $16 \div 2 = \underline{\quad}$

10.  $4 \times \underline{\quad} = 36$      $36 \div 4 = \underline{\quad}$

11.  $8 \times \underline{\quad} = 40$      $40 \div 8 = \underline{\quad}$

### Problem Solving

12. Mr. Martin buys 36 muffins for a class breakfast. He places them on plates for his students. If he places 9 muffins on each plate, how many plates does Mr. Martin use?

\_\_\_\_\_

13. Ralph read 18 books during his summer vacation. He read the same number of books each month for 3 months. How many books did he read each month?

\_\_\_\_\_

## Lesson Check (CC.3.OA.6)

1. Which number will complete the equations?

$$6 \times \square = 24$$

$$24 \div 6 = \square$$

(A) 3

(C) 5

(B) 4

(D) 6

2. Alice has 14 seashells. She divides them equally between her 2 sisters. How many seashells does each sister get?

(A) 7

(C) 12

(B) 8

(D) 16

## Spiral Review (CC.3.OA.1, CC.3.OA.9, CC.3.MD.3)

3. Sam and Jesse can each wash 5 cars in an hour. They both work for 7 hours over 2 days. How many cars did Sam and Jesse wash?

(Lesson 4.6)

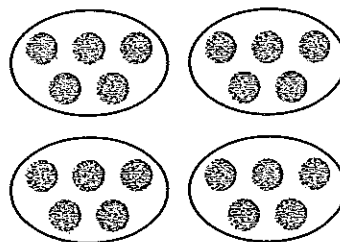
(A) 70

(B) 35

(C) 24

(D) 14

4. Keisha skip counted to find how many counters in all. How many equal groups are there? (Lesson 3.1)



\_\_\_\_\_ groups of 5

(A) 3

(C) 5

(B) 4

(D) 20

5. The key for a picture graph showing the number of books students read is: Each = 2 books. How many books did Nancy read if she has by her name? (Lesson 2.2)

(A) 2

(B) 4

(C) 5

(D) 6

6. Jan surveyed her friends to find their favorite season. She recorded for summer. How many people chose summer as their favorite season? (Lesson 2.1)

(A) 5

(B) 8

(C) 9

(D) 13

Name \_\_\_\_\_

# Write Related Facts

**Essential Question** How can you write a set of related multiplication and division facts?

COMMON CORE STANDARD CC.3.OA.7

Multiply and divide within 100.

## UNLOCK the Problem

**Related facts** are a set of related multiplication and division equations. What related facts can you write for 2, 4, and 8?

### Activity

**Materials** ■ square tiles

#### STEP 1

Use 8 tiles to make an array with 2 equal rows.

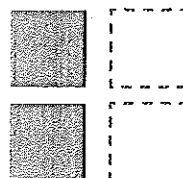
Draw the rest of the tiles.

How many tiles are in each row? \_\_\_\_\_

Write a division equation for the array using the total number of tiles as the dividend and the number of rows as the divisor.

$$\underline{\hspace{1cm}} \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

• What model can you use to show how multiplication and division are related?



Write a multiplication equation for the array.

$$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

#### STEP 2

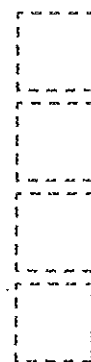
Now, use 8 tiles to make an array with 4 equal rows.

Draw the rest of the tiles.

How many tiles are in each row? \_\_\_\_\_

Write a division equation for the array using the total number of tiles as the dividend and the number of rows as the divisor.

$$\underline{\hspace{1cm}} \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$



Write a multiplication equation for the array.

$$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

So,  $8 \div 2 = \underline{\hspace{1cm}}$ ,  $2 \times 4 = \underline{\hspace{1cm}}$ ,  $8 \div 4 = \underline{\hspace{1cm}}$ ,

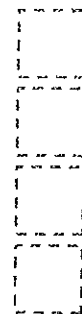
and  $4 \times 2 = \underline{\hspace{1cm}}$  are related facts.

**Try This!** Draw an array with 4 rows of 4 tiles.

Your array shows the related facts for 4, 4, and 16.

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

Since both factors are the same, there are only two equations in this set of related facts.



- Write another set of related facts that has only two equations.

\_\_\_\_\_

**Remember.**

$$\begin{array}{ccccccc} 4 & \times & 4 & = & 16 \\ \uparrow & & \uparrow & & \uparrow \\ \text{factor} & & \text{factor} & & \text{product} \end{array}$$

## Share and Show



- Complete the related facts for this array.



$2 \times 8 = 16$        $16 \div 2 = 8$

\_\_\_\_\_

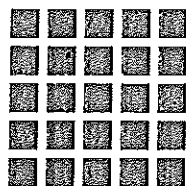
**MATHEMATICAL PRACTICES**

**Math Talk**

Look at the multiplication and division equations in a set of related facts. What do you notice about the products and dividends? Explain.

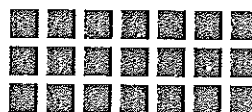
**Write the related facts for the array.**

2.



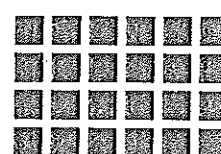
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

✓ 3.



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

✓ 4.



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- Why do the related facts for the array in Exercise 2 have only two equations?

\_\_\_\_\_

Name \_\_\_\_\_

## On Your Own

Write the related facts for the array.



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Write the related facts for the set of numbers.

9. 2, 5, 10

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10. 3, 8, 24

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---

---

11. 6, 6, 36

---

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Complete the related facts.

12.  $4 \times 7 = \underline{\quad}$

$7 \times \underline{\quad} = 28$

$28 \div \underline{\quad} = 4$

$28 \div 4 = \underline{\quad}$

13.  $5 \times \underline{\quad} = 30$

$6 \times \underline{\quad} = 30$

$30 \div 6 = \underline{\quad}$

$30 \div 5 = \underline{\quad}$

14.  $\underline{\quad} \times 9 = 27$

$\underline{\quad} \times 3 = 27$

$\underline{\quad} \div 9 = 3$

$27 \div \underline{\quad} = 9$

15.  $\underline{\quad} \times 5 = 20$

$\underline{\quad} \times 4 = 20$

$20 \div \underline{\quad} = 5$

$\underline{\quad} \div 5 = 4$

16.  $2 \times \underline{\quad} = 12$

$6 \times 2 = \underline{\quad}$

$\underline{\quad} \div 2 = 6$

$12 \div \underline{\quad} = 2$

17.  $5 \times 8 = \underline{\quad}$

$\underline{\quad} \times 5 = 40$


$40 \div 5 = \underline{\quad}$

$\underline{\quad} \div 8 = 5$

# Problem Solving REAL WORLD

Use the table for 18–19.

18. Mr. Lee divides 1 package of clay and 1 package of glitter dough equally among 4 students. How many more glitter dough sections than clay sections does each student get?



Item	Number in Package
Clay	12 sections
Clay tool set	11 tools
Glitter dough	36 sections

19. **Write Math** What's the Error? Ty has a package of glitter dough. He says he can give 9 friends 5 equal sections. Describe his error.

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20. **H.O.T.** Pose a Problem Write a word problem that can be solved by using  $35 \div 5$ . Solve your problem.

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21. **Test Prep** Which equation is NOT included in the same set of related facts as  $9 \times 4 = 36$ ?

- (A)  $4 \times 9 = 36$   
 (B)  $36 \div 6 = 6$   
 (C)  $36 \div 4 = 9$   
 (D)  $36 \div 9 = 4$

SHOW YOUR WORK

**Algebra • Write Related Facts**

**Related facts** are a set of related multiplication and division equations.

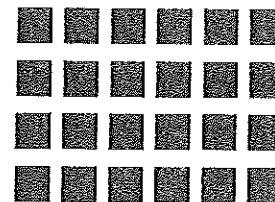
**Write the related facts for the array.**

There are 4 equal rows of tiles.

There are 6 tiles in each row.

There are 24 tiles.

Write 2 multiplication equations and 2 division equations for the array.



factor  $\times$  factor = product

$$\boxed{4} \times \boxed{6} = \boxed{24}$$

$$\boxed{6} \times \boxed{4} = \boxed{24}$$

dividend  $\div$  divisor = quotient

$$\boxed{24} \div \boxed{4} = \boxed{6}$$

$$\boxed{24} \div \boxed{6} = \boxed{4}$$

The equations show how the numbers 4, 6, and 24 are related.

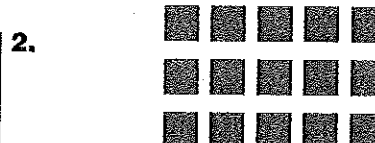
So, the related facts are  $4 \times 6 = 24$ ,  $6 \times 4 = 24$ ,  $24 \div 4 = 6$ , and  $24 \div 6 = 4$ .

**Write the related facts for the array.**



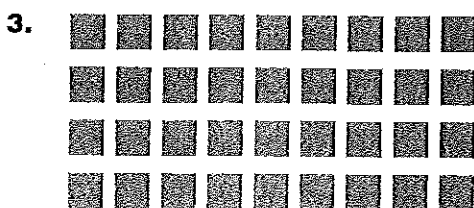

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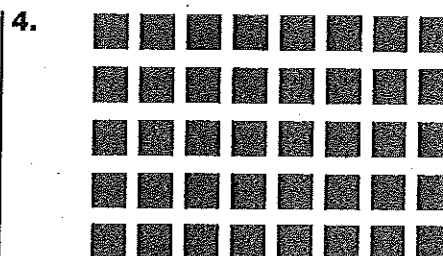

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Name \_\_\_\_\_

## Related Fact Riddles

**Related facts use three numbers. Solve each riddle to find the three numbers. Then, write the set of related facts for the numbers.**

Remember the following vocabulary terms: *dividend*  $\div$  *divisor* = *quotient*.

1. Seven is the quotient. The dividend is a multiple of 3 that is less than 30.
2. The quotient is 7 less than the divisor. The dividend is 18.

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3. This set of related facts contains two numbers less than 10. One of these numbers is the product of 3 and 3. When you multiply the two numbers, the product is a multiple of 5. Write the related facts.
4. The quotient and the divisor are the same number. The sum is 8. Write the related facts.

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5. **Write Math** How many equations did you write for Exercise 4? How do you know your answer is correct?

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6. **Stretch Your Thinking** Write a riddle for three numbers in a set of related facts. Then write the related facts for the numbers.

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Name \_\_\_\_\_

# ALGEBRA

## Lesson 6.8

### Write Related Facts

COMMON CORE STANDARD CC.3.OA.7

Multiply and divide within 100.

Write the related facts for the array.

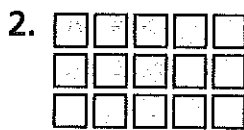


$$2 \times 6 = 12$$

$$6 \times 2 = 12$$

$$12 \div 2 = 6$$

$$12 \div 6 = 2$$



Write the related facts for the set of numbers.

4. 3, 7, 21

5. 2, 9, 18

6. 4, 8, 32

Complete the related facts.

7.  $4 \times 9 = \underline{\hspace{2cm}}$

$9 \times \underline{\hspace{2cm}} = 36$

$36 \div \underline{\hspace{2cm}} = 4$

$\underline{\hspace{2cm}} \div 4 = 9$

8.  $\underline{\hspace{2cm}} \times 7 = 35$

$\underline{\hspace{2cm}} \times 5 = 35$

$\underline{\hspace{2cm}} \div 7 = 5$

$35 \div 5 = \underline{\hspace{2cm}}$

9.  $6 \times \underline{\hspace{2cm}} = 18$

$3 \times 6 = \underline{\hspace{2cm}}$

$18 \div \underline{\hspace{2cm}} = 3$

$\underline{\hspace{2cm}} \div 3 = 6$

### Problem Solving

10. CDs are on sale for \$5 each. Jennifer has \$45 and wants to buy as many as she can. How many CDs can Jennifer buy?

\_\_\_\_\_

11. Mr. Moore has 21 feet of wallpaper. He cuts it into sections that are each 3 feet long. How many sections does Mr. Moore have?

\_\_\_\_\_

## Lesson Check (CC.3.OA.7)

1. Which number completes the set of related facts?

$$\begin{array}{rcl} 5 \times \quad & = & 40 \\ \quad \times 5 & = & 40 \end{array} \quad \begin{array}{rcl} 40 \div \quad & = & 5 \\ 40 \div 5 & = & \end{array}$$

- (A) 6
- (B) 7
- (C) 8
- (D) 9

2. Which equation is not in the same set of related facts as  $4 \times 7 = 28$ ?

- (A)  $7 \times 4 = 28$
- (B)  $4 + 7 = 11$
- (C)  $28 \div 4 = 7$
- (D)  $28 \div 7 = 4$

## Spiral Review (CC.3.OA.1, CC.3.OA.5, CC.3.OA.7, CC.3.NBT.3)

3. Beth runs 20 miles each week for 8 weeks. How many miles does Beth run in 8 weeks? (Lesson 5.5)

- (A) 16 miles
- (B) 28 miles
- (C) 100 miles
- (D) 160 miles

4. Find the product. (Lesson 3.7)

$$5 \times 0$$

- (A) 0
- (B) 1
- (C) 5
- (D) 10

5. Uri's bookcase has 5 shelves. There are 9 books on each shelf. How many books in all are in Uri's bookcase? (Lesson 4.9)

- (A) 14
- (B) 36
- (C) 45
- (D) 54

6. There are 6 batteries in one package. How many batteries will 6 packages have? (Lesson 3.1)

- (A) 12
- (B) 18
- (C) 24
- (D) 36

Name \_\_\_\_\_

### Division Rules for 1 and 0

**Essential Question** What are the rules for dividing with 1 and 0?

COMMON CORE STANDARD CC.3.OA.5

Understand properties of multiplication and the relationship between multiplication and division.

### UNLOCK the Problem REAL WORLD

What rules for division can help you divide with 1 and 0?

If there is only 1 fishbowl, then all the fish must go in that fishbowl.



$$\begin{array}{ccccc} 4 & \div & 1 & = & 4 \\ \uparrow & & \uparrow & & \uparrow \\ \text{number} & & \text{number} & & \text{number in} \\ \text{of fish} & & \text{of bowls} & & \text{each bowl} \end{array}$$

**Try This!** There are 3 fish and 1 fishbowl. Draw a quick picture to show the fish in the fishbowl.

Write the equation your picture shows.

$$\underline{\hspace{1cm}} \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

**Rule A:** Any number divided by 1 equals that number.

**MATHEMATICAL PRACTICES**

**Math Talk** Explain how Rule A is related to the Identity Property of Multiplication.

If there is the same number of fish and fishbowls, then 1 fish goes in each fishbowl.



$$\begin{array}{ccccc} 4 & \div & 4 & = & 1 \\ \uparrow & & \uparrow & & \uparrow \\ \text{number} & & \text{number} & & \text{number in} \\ \text{of fish} & & \text{of bowls} & & \text{each bowl} \end{array}$$

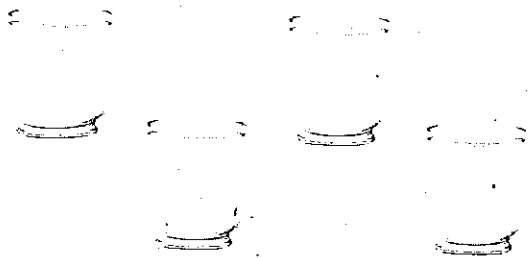
**Try This!** There are 3 fish and 3 fishbowls. Draw a quick picture to show the fish divided equally among the fishbowls.

Write the equation your picture shows.

$$\underline{\hspace{1cm}} \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

**Rule B:** Any number (except 0) divided by itself equals 1.

If there are 0 fish and 4 fishbowls, there will not be any fish in the fishbowls.



$$\begin{array}{ccccc} 0 & \div & 4 & = & 0 \\ \uparrow & & \uparrow & & \uparrow \\ \text{number} & & \text{number} & & \text{number in} \\ \text{of fish} & & \text{of bowls} & & \text{each bowl} \end{array}$$

**Try This!** There are 0 fish and 3 fishbowls. Draw a quick picture to show the fishbowls.

Write the equation your picture shows.

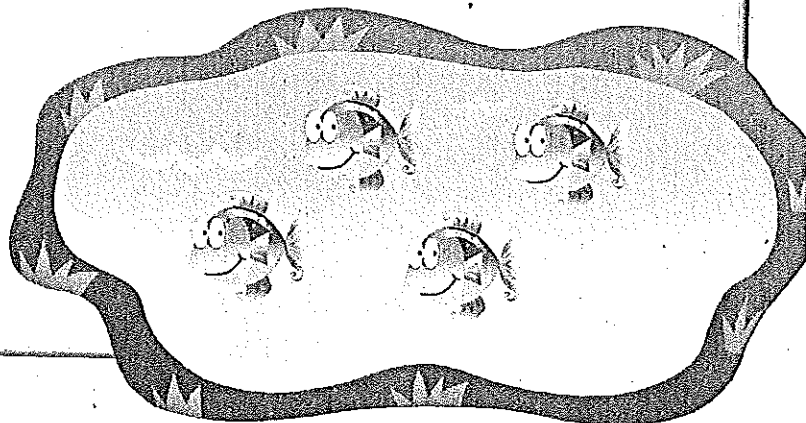
$$\underline{\hspace{1cm}} \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

**Rule C:** Zero divided by any number (except 0) equals 0.

If there are 0 fishbowls, then you cannot separate the fish equally into fishbowls. Dividing by 0 is not possible.

~~$$4 \div 0 = \square$$~~

**Rule D:** You cannot divide by 0.



## Share and Show



1. Use the picture to find  $2 \div 2$ . \_\_\_\_\_



### MATHEMATICAL PRACTICES

#### Math Talk

Explain what happens when you divide a number (except 0) by itself.

Find the quotient.

2.  $7 \div 1 =$  \_\_\_\_\_ 3.  $8 \div 8 =$  \_\_\_\_\_ 4.  $0 \div 5 =$  \_\_\_\_\_ 5.  $6 \div 6 =$  \_\_\_\_\_

Name \_\_\_\_\_

## On Your Own .....

Find the quotient.

6.  $0 \div 8 =$  \_\_\_\_\_ 7.  $5 \div 5 =$  \_\_\_\_\_ 8.  $2 \div 1 =$  \_\_\_\_\_ 9.  $0 \div 7 =$  \_\_\_\_\_

10.  $5 \overline{)0}$

11.  $1 \overline{)9}$

12.  $7 \overline{)7}$

13.  $10 \overline{)10}$

**Practice: Copy and Solve** Find the quotient.

14.  $6 \div 1$

15.  $25 \div 5$

16.  $0 \div 6$

17.  $18 \div 3$

18.  $14 \div 2$

19.  $9 \div 9$

20.  $28 \div 4$

21.  $8 \div 1$

22.  $3 \overline{)27}$

23.  $5 \overline{)10}$

24.  $3 \overline{)0}$

25.  $1 \overline{)0}$

## Problem Solving



26. Claire has 7 parakeets. She puts 4 in a cage. She divides the other parakeets equally among 3 friends to hold. How many parakeets does each friend get to hold?

\_\_\_\_\_

27. Lena has some parrots. She gives each parrot 1 grape. If Lena gives out 5 grapes, how many parrots does she have?

\_\_\_\_\_

28. **Write Math** Suppose a pet store has 21 birds that are in 21 cages. Use what you know about division rules to find the number of birds in each cage. Explain your answer.

\_\_\_\_\_

\_\_\_\_\_

SHOW YOUR WORK

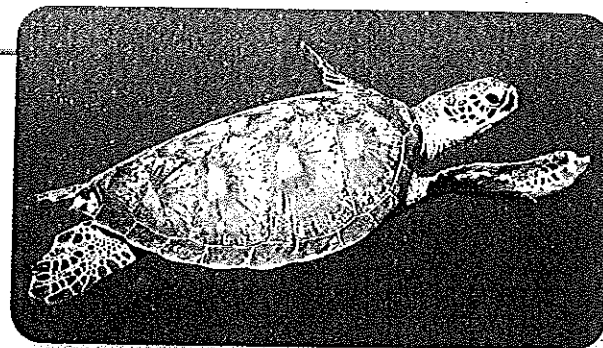
29. Test Prep Joe has 4 horses. He puts each horse in its own stall. How many stalls does Joe use?

(A) 0      (B) 1      (C) 2      (D) 4

### Connect to Reading

#### Compare and Contrast

You have learned the rules for division with 1. Compare and contrast them to help you learn how to use the rules to solve problems.



**Compare the rules. Think about how they are *alike*.**

**Contrast the rules. Think about how they are *different*.**

**Read:** Rule A: Any number divided by 1 equals that number.  
Rule B: Any number (except 0) divided by itself equals 1.

**Compare:** How are the rules alike?

- Both are division rules for 1.

**Contrast:** How are the rules different?

- Rule A is about dividing a number by 1. The quotient is that number.
- Rule B is about dividing a number (except 0) by itself. The quotient is always 1.

**Read the problem. Write an equation. Solve.**

**Circle Rule A or Rule B to tell which rule you used.**

30. Jamal bought 7 goldfish at the pet store. He put them in 1 fishbowl. How many goldfish did he put in the fishbowl?

Rule A

Rule B

31. Ava has 6 turtles. She divides them equally among 6 aquariums. How many turtles does she put in each aquarium?

Rule A

Rule B

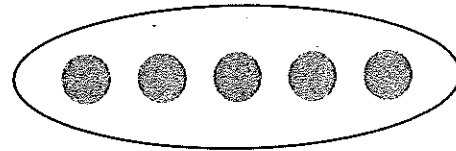
Name \_\_\_\_\_

# Algebra • Division Rules for 1 and 0

Division rules can help you understand how to divide with 1 and 0.

**Rule A:** Any number divided by 1 equals that number.

$$5 \div 1 = 5 \quad \text{or} \quad 1 \overline{)5}$$



One group of 5

**Rule B:** Any number (except 0) divided by itself equals 1.

$$5 \div 5 = 1 \quad \text{or} \quad 5 \overline{)5}$$



Five groups of 1

**Rule C:** Zero divided by any number (except 0) equals 0.

$$0 \div 5 = 0 \quad \text{or} \quad 5 \overline{)0}$$



Five groups of 0

**Rule D:** You cannot divide by 0.

Find the quotient.

1.  $4 \div 1 = \underline{\quad}$     2.  $2 \div 2 = \underline{\quad}$     3.  $8 \div 1 = \underline{\quad}$     4.  $7 \div 7 = \underline{\quad}$

5.  $0 \div 8 = \underline{\quad}$     6.  $0 \div 9 = \underline{\quad}$     7.  $4 \div 4 = \underline{\quad}$     8.  $6 \div 1 = \underline{\quad}$

9.  $6 \div 6 = \underline{\quad}$     10.  $0 \div 4 = \underline{\quad}$     11.  $0 \div 2 = \underline{\quad}$     12.  $3 \div 1 = \underline{\quad}$

Name \_\_\_\_\_

## A Planet of 1 and 0

Fill in the correct quotient to complete the fact.

Then, fill in the other blank with the word that makes the most sense from the box below. Each word may be used only once. Some words will not be used.

planets	kite	letter
rock	toes	cities

1. On the Earth's surface, there are \_\_\_\_\_ basic types of \_\_\_\_\_.  
(3 ÷ 1)

2. The number \_\_\_\_\_ looks like the \_\_\_\_\_ 0.  
(0 ÷ 4)

3. There are usually \_\_\_\_\_ fingers and \_\_\_\_\_ on each hand and foot.  
(5 ÷ 1)

4. In our solar system, \_\_\_\_\_ of the \_\_\_\_\_, Mercury and Venus, have no moons.  
(2 ÷ 1)

5. **Stretch Your Thinking** If Exercise 2 had read  $4 \div 0$ , could it be solved? **Explain.**

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6. **Write Math** Write a fill-in story like the exercises above, using a rule for 1 or 0. Use one of the words left in the box.

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Name \_\_\_\_\_

## ALGEBRA

### Lesson 6.4

## Division Rules for 1 and 0

COMMON CORE STANDARD CC.3.OA.5

Understand properties of multiplication and the relationship between multiplication and division.

Find the quotient.

1.  $3 \div 1 = \underline{3}$

2.  $8 \div 8 = \underline{\quad}$

3.  $\underline{\quad} = 0 \div 6$

4.  $2 \div 2 = \underline{\quad}$

5.  $\underline{\quad} = 9 \div 1$

6.  $0 \div 2 = \underline{\quad}$

7.  $0 \div 3 = \underline{\quad}$

8.  $\underline{\quad} = 0 \div 4$

9.  $7 \overline{)7}$

10.  $1 \overline{)6}$

11.  $9 \overline{)0}$

12.  $1 \overline{)5}$

13.  $1 \overline{)0}$

14.  $4 \overline{)4}$

15.  $1 \overline{)10}$

16.  $2 \overline{)2}$

### Problem Solving

**REAL WORLD**

17. There are no horses in the stables. There are 3 stables in all. How many horses are in each stable?

\_\_\_\_\_

18. Jon has 6 kites. He and his friends will each fly 1 kite. How many people in all will fly a kite?

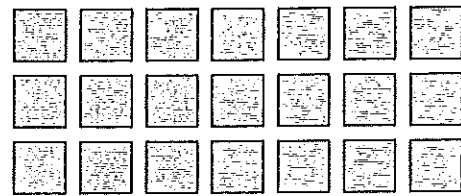
\_\_\_\_\_

# Lesson Check (CC.3.OA.5)

- Candace has 6 pairs of jeans. She places each pair on its own hanger. How many hangers does Candace use?  
 (A) 0 (B) 1 (C) 6 (D) 12
- There are 0 birds and 4 bird cages. Which division equation describes how many birds are in each cage?  
 (A)  $0 \div 4 = 0$  (B)  $4 \div 4 = 1$  (C)  $4 \div 1 = 4$  (D)  $0 \times 4 = 0$

# Spiral Review (CC.3.OA.5, CC.3.OA.9, CC.3.MD.3)

- There are 7 plates on the table. There are 0 sandwiches on each plate. How many sandwiches are on the plates in all? (Lesson 3.7)  
 $7 \times 0$   
 (A) 0 (B) 1 (C) 7 (D) 70
- Which shows a way to break apart the array to find the product? (Lesson 4.4)



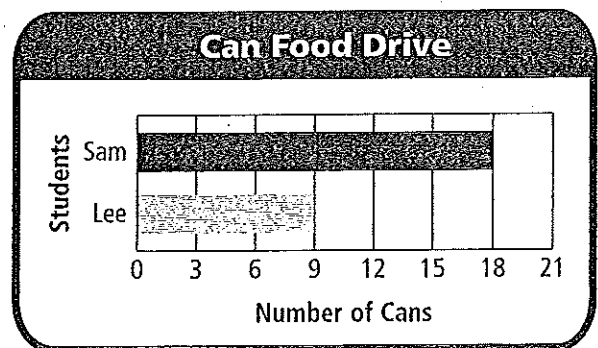
- $(3 \times 5) + (3 \times 2)$
- $(2 \times 8) + (1 \times 8)$
- $(4 \times 7) + (1 \times 7)$
- $(3 \times 6) + (3 \times 3)$

- Which of the following describes a pattern in the table? (Lesson 5.1)

Vans	1	2	3	4	5
Students	6	12	18	24	30

- Add 5.
- Multiply by 2.
- Subtract 1.
- Multiply by 6.

- Use the graph.



How many more cans did Sam bring in than Lee? (Lesson 2.5)

- 4 (B) 5 (C) 7 (D) 9

Name \_\_\_\_\_

## Chapter 6 Review/Test

### ► Vocabulary

Choose the best term from the box to complete the sentence.

#### Vocabulary

dividend

inverse operations

related facts

1. Multiplication and division are opposite operations,

or \_\_\_\_\_ (p. 235)

2. \_\_\_\_\_ are a set of related multiplication and division equations. (p. 239)

### ► Concepts and Skills

Make an array. Then write a division equation. (CC.3.OA.3)

3. 32 tiles in 4 rows

\_\_\_\_\_

4. 28 tiles in 7 rows

\_\_\_\_\_

Complete the equations. (CC.3.OA.6)

5.  $3 \times \underline{\hspace{1cm}} = 24$       $24 \div 3 = \underline{\hspace{1cm}}$

6.  $5 \times \underline{\hspace{1cm}} = 15$       $15 \div 5 = \underline{\hspace{1cm}}$

7.  $7 \times \underline{\hspace{1cm}} = 49$       $49 \div 7 = \underline{\hspace{1cm}}$

8.  $9 \times \underline{\hspace{1cm}} = 18$       $18 \div 9 = \underline{\hspace{1cm}}$

Complete the related facts. (CC.3.OA.7)

9.  $4 \times 8 = \underline{\hspace{1cm}}$

$8 \times \underline{\hspace{1cm}} = 32$

$32 \div \underline{\hspace{1cm}} = 8$

$32 \div 8 = \underline{\hspace{1cm}}$

10.  $3 \times \underline{\hspace{1cm}} = 9$

$\underline{\hspace{1cm}} \div 3 = 3$

11.  $6 \times \underline{\hspace{1cm}} = 42$

$7 \times 6 = \underline{\hspace{1cm}}$

$\underline{\hspace{1cm}} \div 6 = 7$

$42 \div \underline{\hspace{1cm}} = 6$



Fill in the bubble for the correct answer choice.

12. Caroline has 27 books. She put an equal number of her books on each of 3 shelves. How many books are on each shelf? (CC.3.OA.2)
- (A) 7  
(B) 8  
(C) 9  
(D) 10
13. Leo has 24 cookies. He wants to put groups of 6 cookies on a plate. How many plates does he need? (CC.3.OA.2)
- (A) 4  
(B) 5  
(C) 18  
(D) 30
14. A pet shop has 18 hamsters. They sold 10 and put the remaining hamsters into 8 cages. How many hamsters are in each cage? (CC.3.OA.5)
- (A) 8  
(B) 4  
(C) 2  
(D) 1
15. Aidan bought 14 goldfish and 2 fishbowls. He put an equal number of fish in each fishbowl. Which equation can be used to find how many goldfish are in each fishbowl? (CC.3.OA.3)
- (A)  $14 - 2 = \square$   
(B)  $2 + \square = 14$   
(C)  $14 \div 2 = \square$   
(D)  $2 \times 14 = \square$

Name \_\_\_\_\_

# TEST PREP

Fill in the bubble for the correct answer choice.

16. Which division equation belongs to this set of related facts? (CC.3.OA.7)

$$4 \times 6 = 24 \qquad 6 \times 4 = 24$$

- (A)  $20 \div 4 = 5$
- (B)  $24 \div 6 = 4$
- (C)  $18 \div 6 = 3$
- (D)  $24 \div 3 = 8$

17. Jasmine made some cards for her family. She used 16 stickers and put 4 of them on each card. How many cards did Jasmine make? (CC.3.OA.2)

- (A) 2
- (B) 3
- (C) 4
- (D) 5

18. Which of the following multiplication equations can be used to find  $42 \div 7$ ? (CC.3.OA.6)

- (A)  $6 \times 6 = 36$
- (B)  $5 \times 8 = 40$
- (C)  $8 \times 6 = 48$
- (D)  $7 \times 6 = 42$

19. Jill has 6 puppies. The puppies play in 1 crate. How many puppies are in the crate? (CC.3.OA.5)

- (A) 0
- (B) 1
- (C) 6
- (D) 7

► Constructed Response

20. Brendan bought 30 baseball cards. They came in packs of 10. How many packs of baseball cards did Brendan buy? Explain how you found the answer.

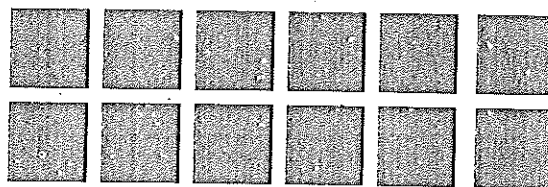
(CC.3.OA.3)

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21. Sue drew this array. Write the related facts represented by the array. (CC.3.OA.7)



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► Performance Task (CC.3.OA.2, CC.3.OA.3)

22. There are 20 students in Mr. Hamilton's class. He wants to put the students in equal groups.

A List as many ways as you can to arrange the students in equal groups.

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B Tell how you know you found all the ways.

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# Chapter 6 Review/Test

## Formative Assessment

Chapter Review/Test  
students' progress in  
6.

I want to review with  
the essential question for  
6.

## Essential Question

How do you use division to find  
the number in each group or how  
many equal groups?

Use the following questions to  
assess students' thinking:

How are multiplication and  
division related?

How can models help you  
understand division?

How can a subtraction help you  
understand division?

Name \_\_\_\_\_

### Chapter 6 Review/Test

**Vocabulary**  
Choose the best term from the box to complete the sentence.

1. Multiplication and division are opposite operations, or inverse operations. (p. 239)

2. Related facts are a set of related multiplication and division equations. (p. 239)

**Concepts and Skills**  
Make an array. Then write a division equation. (CC.3.OA.3) Check students' arrays.

3. 32 tiles in 4 rows  $32 \div 4 = 8$       4. 28 tiles in 7 rows  $28 \div 7 = 4$

Complete the equations. (CC.3.OA.3)

5.  $3 \times \underline{8} = 24$      $24 \div 3 = \underline{8}$     6.  $5 \times \underline{3} = 15$      $15 \div 5 = \underline{3}$

7.  $7 \times \underline{7} = 49$      $49 \div 7 = \underline{7}$     8.  $9 \times \underline{2} = 18$      $18 \div 9 = \underline{2}$

Complete the related facts. (CC.3.OA.3)

9.  $4 \times 8 = \underline{32}$      $10. 3 \times \underline{3} = 9$      $11. 6 \times \underline{7} = 42$

$8 \times \underline{4} = 32$      $\underline{9} \div 3 = 3$      $7 \times 6 = \underline{42}$

$32 \div \underline{4} = 8$      $\underline{42} \div 6 = 7$

$32 \div 8 = \underline{4}$      $42 \div \underline{7} = 6$

GO! Assessment Options  
Online Chapter Test

Chapter 6 247

Fill in the bubble for the correct answer choice.



12. Caroline has 27 books. She put an equal number of her books on each of 3 shelves. How many books are on each shelf? (CC.3.OA.3)
- ☐ A 7  
☐ B 8  
☐ C 9  
☐ D 10
13. Leo has 24 cookies. He wants to put groups of 6 cookies on a plate. How many plates does he need? (CC.3.OA.3)
- ☐ A 4  
☐ B 5  
☐ C 18  
☐ D 30
14. A pet shop has 18 hamsters. They sold 10 and put the remaining hamsters into 8 cages. How many hamsters are in each cage? (CC.3.OA.5)
- ☐ A 8  
☐ B 4  
☐ C 2  
☐ D 1
15. Alden bought 14 goldfish and 2 fishbowls. He put an equal number of fish in each fishbowl. Which equation can be used to find how many goldfish are in each fishbowl? (CC.3.OA.3)
- ☐ A  $14 - 2 = \square$   
☐ B  $2 + \square = 14$   
☐ C  $14 \div 2 = \square$   
☐ D  $2 \times 14 = \square$

## Data-Driven Decision Making RtI

Based on the results of the Chapter Review/Test use the following resources to review skills:

Item	Lesson	CCSS	Common Error	Intervene With	Soar to Success Math
4, 15	6.1, 6.6	CC.3.OA.3	May confuse the divisor and quotient	R—6.1, 6.6; TE—pp. 209B, 231B	13.17, 13.23
8, 18	6.7	CC.3.OA.6	May not understand how to relate multiplication and division	R—6.7; TE—p. 235B	30.35
11, 16	6.8	CC.3.OA.7	May not use the same three numbers for each related fact	R—6.8; TE—p. 239B	30.36
12	6.2	CC.3.OA.2	May miscount the number in each group	R—6.2; TE—p. 213B	13.02
3, 1	6.3	CC.3.OA.2	May miscount the number of groups	R—6.3; TE—p. 217B	13.22
4, 19	6.9	CC.3.OA.5	May not use the rule for division by 1 correctly	R—6.9; TE—p. 243B	13.21

Fill in the bubble for the correct answer choice.

16. Which division equation belongs to this set of related facts? (CC.3.OA.7)

$4 \times 6 = 24$        $6 \times 4 = 24$

- ☐ A  $20 \div 4 = 5$   
☐ B  $24 \div 6 = 4$   
☐ C  $8 \div 6 = 3$   
☒ D  $24 \div 3 = 8$

17. Jasmine made some cards for her family. She used 16 stickers and put 4 of them on each card. How many cards did Jasmine make? (CC.3.OA.7)

- ☐ A 2  
☐ B 3  
☐ C 4  
☒ D 5

18. Which of the following multiplication equations can be used to find  $42 \div 7$ ? (CC.3.OA.4)

- ☐ A  $6 \times 6 = 36$   
☐ B  $5 \times 8 = 40$   
☐ C  $8 \times 6 = 48$   
☒ D  $7 \times 6 = 42$

19. Jill has 6 puppies. The puppies play in 1 crate. How many puppies are in the crate? (CC.3.OA.7)

- ☐ A 0  
☐ B 1  
☒ C 6  
☐ D 7

**Constructed Response**

20. Brendan bought 30 baseball cards. They came in packs of 10. How many packs of baseball cards did Brendan buy? Explain how you found the answer. (CC.3.OA.7)

3 packs; Possible explanation: I started at 30 and subtracted 10 until I got to 0. I subtracted 10 three times. There are 3 groups of 10 in 30.

21. Sue drew this array. Write the related facts represented by the array. (CC.3.OA.7)



$2 \times 6 = 12$        $6 \times 2 = 12$   
 $12 \div 2 = 6$        $12 \div 6 = 2$

**Performance Task** (CC.3.OA.2, CC.3.OA.3)

22. There are 20 students in Mr. Hamilton's class. He wants to put the students in equal groups.

- ☐ A List as many ways as you can to arrange the students in equal groups.

Possible answer: 2 groups of 10; 10 groups of 2;  
 4 groups of 5; 5 groups of 4. (Some students might include 1 group of 20 and 20 groups of 1.)

- ☐ B Tell how you know you found all the ways.

Possible explanation: I used 20 counters and started with groups of 2, to try and make equal groups. Then I tried with groups of 3 and other equal groups until I found all the ways.

**Performance Task Scoring Rubric**

3	Generally accurate, complete, and clear: All parts of the task are successfully completed. The student demonstrates sound reasoning and an understanding of the key concepts and procedures. Explanations are complete and clear with no meaningful errors.
2	Accurate results without sufficient support: All parts of the task are completed. While correct answers may indicate some understanding of the key concepts and procedures, explanations are lacking in reasoning and mathematical justification.
1	Partially accurate: Part of the task is successfully completed while other parts may be attempted, but not successfully completed. The student demonstrates minimal understanding of key concepts and procedures.
0	Not accurate, complete, and clear: No part of the task is completed with any success. There is little, if any, evidence that the student understands key concepts and procedures.

**Performance Indicators**

Student with a Level 3 paper:

- lists all the possible combinations to make equal groups.
- explains how he or she approached finding ways to group the students.
- describes a systematic method for finding all the ways to make equal groups.
- shows work in an organized manner that is easy to follow and clearly supports the answers given.

**Constructed Response**

Score students' responses with a 2-1-0 rubric (see *Assessment Guide*). A level 2 response would include:

For Problem 20, students need to find how many equal groups of 10 they can make with 30 baseball cards. Their explanation should include the strategy they used to find  $30 \div 10$ .

For Problem 21, students need to find the related facts represented by a given array. Students' solutions should include all 4 equations for the related facts for 2, 6, and 12.

**Performance Task**

Use the performance indicators, scoring rubric, and DOK level to evaluate conceptual understanding.



**Depth of Knowledge**

Item	DOK Level
22A	1
22B	1

**Chapter 6 Extra Practice****Lessons 6.1 - 6.3**

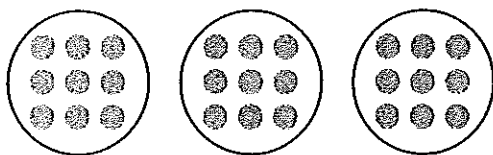
Make equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
1.	18	9	
2.	24		8
3.	12	6	
4.	35	7	
5.	32		4
6.	25		5

**Lesson 6.4**

Write a division equation for the picture.

1.



2.




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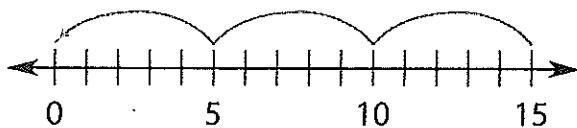


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**Lesson 6.5**

Write a division equation.

1.



2.

$$\begin{array}{r}
 24 \\
 - 6 \\
 \hline
 18
 \end{array}
 \begin{array}{r}
 18 \\
 - 6 \\
 \hline
 12
 \end{array}
 \begin{array}{r}
 12 \\
 - 6 \\
 \hline
 6
 \end{array}
 \begin{array}{r}
 6 \\
 - 6 \\
 \hline
 0
 \end{array}$$

---



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## Lesson 6.6

Make an array. Then write a division equation.

1. 12 tiles in 4 rows

\_\_\_\_\_

2. 18 tiles in 3 rows

\_\_\_\_\_

3. 35 tiles in 5 rows

\_\_\_\_\_

4. 28 tiles in 7 rows

\_\_\_\_\_

## Lesson 6.7

Complete the equations.

1.  $8 \times \underline{\quad} = 40$      $40 \div 8 = \underline{\quad}$

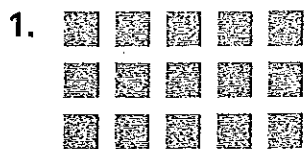
2.  $6 \times \underline{\quad} = 36$      $36 \div 6 = \underline{\quad}$

3.  $3 \times \underline{\quad} = 21$      $21 \div 3 = \underline{\quad}$

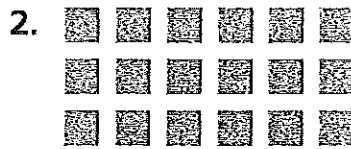
4.  $2 \times \underline{\quad} = 18$      $18 \div 2 = \underline{\quad}$

## Lesson 6.8 (pp. 239–243)

Write the related facts for the array.



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Lesson 6.9

Find the quotient.

1.  $7 \div 1 = \underline{\quad}$

2.  $4 \div 4 = \underline{\quad}$

3.  $9 \div 1 = \underline{\quad}$

4.  $0 \div 1 = \underline{\quad}$

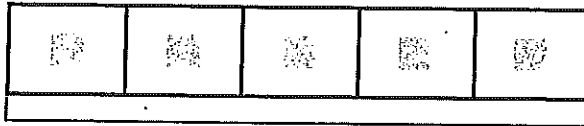
5. Anton has 8 flower pots. He plants 1 seed in each pot. How many seeds does Anton use?

\_\_\_\_\_

Choose the correct answer.

CC.3.OA.2

1. The baseball coach ordered 40 gloves for 5 teams. If each team gets the same number of gloves, how many will each team get?

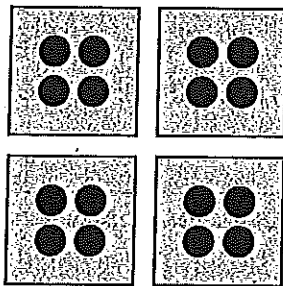


40 gloves

- A 7                      C 9  
B 8                      D 10

CC.3.OA.2

2. Mr. Jackson has 16 flashcards. He gives an equal number of flashcards to 4 groups.



How many flashcards does Mr. Jackson give to each group?

- A 4                      C 12  
B 8                      D 16

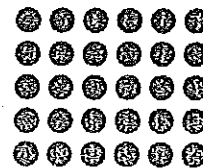
CC.3.OA.5

3. Otis paid \$7 for some markers for school. Each marker cost \$1. How many markers did Otis buy?

- A 0  
B 1  
C 6  
D 7

CC.3.OA.3

4. Anna planted 30 pumpkin seeds equally in 5 rows.

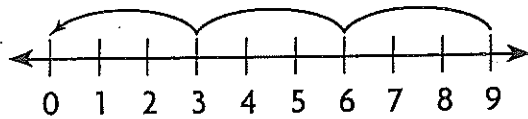


How many pumpkin seeds did Anna plant in each row?

- A 4  
B 5  
C 6  
D 8

CC.3.OA.3

5. Marco's mother bought 9 toy cars. She asked Marco to share the cars equally among his friends. Marco used a number line to help him.



Which division equation is represented by the number line?

- A  $9 \div 3 = 3$   
 B  $3 \div 3 = 1$   
 C  $9 \div 9 = 1$   
 D  $6 \div 3 = 2$

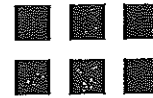
CC.3.OA.3

6. Heather places 32 stamps into groups of 8. How many groups of stamps are there?

- A 3  
 B 4  
 C 6  
 D 7

CC.3.OA.7

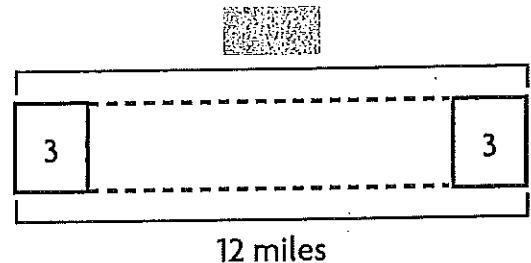
7. Fritz wrote a set of related facts for the array below. Which equation is **not** included in the set of related facts for this array?



- A  $6 \times 3 = 18$   
 B  $6 \div 2 = 3$   
 C  $3 \times 2 = 6$   
 D  $2 \times 3 = 6$

CC.3.OA.2

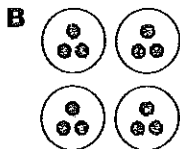
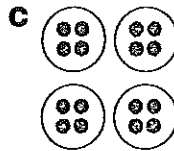
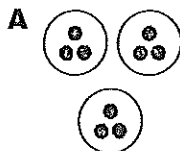
8. Rico went for a 12-mile bike ride. He stopped every 3 miles to take pictures. How many times did Rico stop during his bike ride?



- A 3  
 B 4  
 C 9  
 D 15

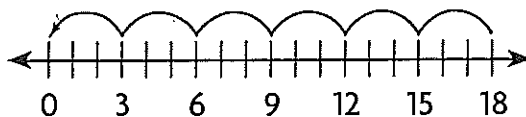
CC.3.OA.2

9. Jason has 12 books. He wants to place his books in 4 equal stacks. Which model shows how many books Jason should put in each stack?



CC.3.OA.3

10. Tara made \$18 selling cookies. She wants to know how many cookies she sold. Tara used a number line to help her.



Which division equation is represented by the number line?

- A  $18 \div 2 = 9$   
 B  $18 \div 9 = 2$   
 C  $18 \div 3 = 6$   
 D  $18 \div 18 = 1$

CC.3.OA.2

11. Linda picked 48 flowers. She placed them equally into 8 vases. How many flowers are in each vase?

- A 4  
 B 5  
 C 6  
 D 7

CC.3.OA.5

12. John made 8 cat treats. He divided the cat treats equally among 8 cats. How many cat treats did John give to each cat?

- A 0  
 B 1  
 C 4  
 D 8

CC.3.OA.6

13. Yolanda knitted 15 scarves in 3 different colors. If she made the same number of scarves of each color, how many scarves of each color did she make?

$$3 \times \square = 15 \quad 15 \div 3 = \square$$

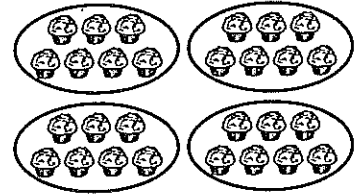
- A 4  
 B 5  
 C 9  
 D 12

Write the correct answer.

- CC.3.OA.2
14. Mrs. Rinks buys 24 beads. Each bag holds 8 beads. How many bags of beads does Mrs. Rinks buy?
- \_\_\_\_\_

- CC.3.OA.7
15. Peter writes a set of related facts. One of the facts he writes is  $18 \div 6 = 3$ . Write an equation that is included in the same set of related facts.
- \_\_\_\_\_
- \_\_\_\_\_

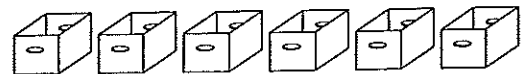
- CC.3.OA.2
16. Sandy divided a batch of muffins into 4 bags to sell at the bake sale.



Write the division equation represented by the picture.

\_\_\_\_\_

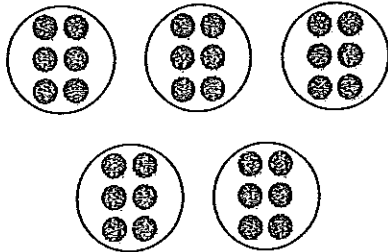
- CC.3.OA.5
17. There are 0 toys and 6 toy chests. How many toys are in each toy chest?



Name \_\_\_\_\_

CC.3.OA.2

18. During a field trip, 30 students in Mrs. Beckman's class were placed into groups of 6 students each for a tour of the museum. How many groups were there?



\_\_\_\_\_

CC.3.OA.3

19. Lola bought a bag of 15 apples for her friends. She used repeated subtraction to help her divide the apples equally among her friends.

$$\begin{array}{r} 15 \\ - 5 \\ \hline 10 \end{array} \quad \begin{array}{r} 10 \\ - 5 \\ \hline 5 \end{array} \quad \begin{array}{r} 5 \\ - 5 \\ \hline 0 \end{array}$$

Write a division equation that matches the repeated subtraction.

\_\_\_\_\_

CC.3.OA.7

20. Carlos uses the numbers 3, 7, and 21 to write a set of related facts. Write an equation that is part of the set of related facts that Carlos writes.

\_\_\_\_\_  
\_\_\_\_\_

CC.3.OA.2

21. Mr. Kane wants to divide craft sticks into groups of 6 for an art project. How many groups of 6 can be made with 24 craft sticks?

\_\_\_\_\_

Name \_\_\_\_\_

CC.3.OA.2

22. Miller has 20 blocks. He makes 5 equal groups. How many blocks does Miller put in each group?

\_\_\_\_\_

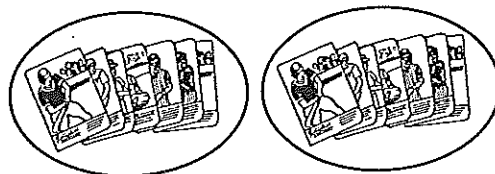
CC.3.OA.7

23. Tinley buys 56 hamburger buns for the team party. The hamburger buns come in packages of 8. Write a related multiplication fact for this problem.

\_\_\_\_\_

CC.3.OA.2

24. Rex and Theodore shared a package of 14 baseball cards equally.



How many baseball cards will each boy get?

\_\_\_\_\_

CC.3.OA.2

25. There are 18 students in the science club. Mrs. Rios separates the students into two equal groups. How many students are in each group?

□	□
---	---

18 students

\_\_\_\_\_

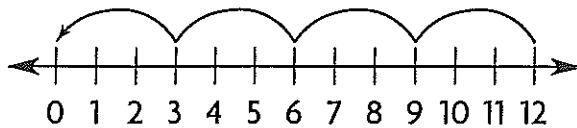
GO ON

**Constructed Response**

CC.3.OA.3

26. Laila and Sophia use different ways to solve the division equation  $12 \div 3 = \square$ . Compare and contrast the two ways. Then solve.

Laila's Way



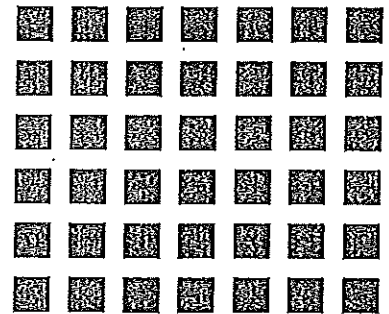
Sophia's Way

$$\begin{array}{r} 12 \\ - 3 \\ \hline 9 \end{array} \quad \begin{array}{r} 9 \\ - 3 \\ \hline 6 \end{array} \quad \begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array} \quad \begin{array}{r} 3 \\ - 3 \\ \hline 0 \end{array}$$

**Extended Constructed Response**

CC.3.OA.7 CC.3.OA.6 CCSS.Math.Practice.MP1

27. Gretchen used 42 tiles to make an array.



- A Gretchen wrote a set of related facts for the array. Write the set of related facts. Explain why the equations you write are related.

- B Gretchen makes another array and writes only two equations to show the related facts. Explain why she might have done this. Write a set of related facts that Gretchen could have written for her array.

CC.3.OA.7

CC.3.OA.6

CCSS.Math.Practice.MP1



**Constructed Response**

The Constructed Response item is scored using the 3-point scoring rubric in the *Assessment Guide*. A student can receive partial credit for answers that are partially correct or partially completed.

**Performance Indicators**

*For Problem 26, a student with a Level 2 paper:*

- \_\_\_\_\_ identifies that both methods show the relationship between subtraction and division.
- \_\_\_\_\_ explains that Laila's way uses jumps on a number line while Sophia's way uses repeated subtraction.
- \_\_\_\_\_ completes the division equation correctly.

**Extended Constructed Response**

The Extended Constructed Response item is scored using the 4-point scoring rubric in the *Assessment Guide*. A student can receive partial credit for answers that are partially correct or partially completed.

**Performance Indicators**

*For Problem 27, a student with a Level 3 paper:*

- \_\_\_\_\_ identifies the four equations in the set of related facts.
- \_\_\_\_\_ explains that related facts use inverse operations.
- \_\_\_\_\_ explains that related facts use the same numbers.
- \_\_\_\_\_ describes an array that has the same number of rows and columns.
- \_\_\_\_\_ tells why only two equations are needed for the array.
- \_\_\_\_\_ writes a possible set of related facts.