Unit 04: **Division (11 days)**

Possible Lesson 01 (6 days)
Possible Lesson 02 (5 days)

POSSIBLE LESSON 01 (6 days)

This lesson is one approach to teaching the State Standards associated with this unit. Districts are encouraged to customize this lesson by supplementing with district-approved resources, materials, and activities to best meet the needs of learners. The duration for this lesson is only a recommendation, and districts may modify the time frame to meet students' needs. To better understand how your district is implementing CSCOPE lessons, please contact your child's teacher. (For your convenience, please find linked the TEA Commissioner's List of **State Board of Education Approved Instructional Resources** and **Midcycle State Adopted Instructional Materials**.)

Lesson Synopsis:
Students investigate the concept of division using base-ten blocks to solve real-life situations.

TEKS:
The Texas Essential Knowledge and Skills (TEKS) listed below are the standards adopted by the State Board of Education, which are required by Texas law. Any standard that has a strike-through (e.g. ~~sample phrase~~) indicates that portion of the standard is taught in a previous or subsequent unit.

The TEKS are available on the Texas Education Agency website at **http://www.tea.state.tx.us/index2.aspx?id=6148**

4.4	*Number, operation, and quantitative reasoning.. The student multiplies and divides to solve meaningful problems involving whole numbers. The student is expected to:*
4.4A	Model factors and products using arrays and area models. *Supporting Standard*
4.4B	Represent ~~multiplication and~~ division situations in picture, word, and number form. *Supporting Standard*
4.4C	Recall and apply multiplication facts through 12 x 12. *Supporting Standard*
4.6	*Patterns, relationships, and algebraic thinking.. The student uses patterns in multiplication and division. The student is expected to:*

4.6A	Use patterns and relationships to develop strategies to remember basic multiplication and division facts (such as the patterns in related multiplication and division number sentences (fact families) such as 9 x 9 = 81 and 81 ÷ 9 = 9). *Supporting Standard*

Underlying Processes and Mathematical Tools TEKS:

4.14	*Underlying processes and mathematical tools.. The student applies Grade 4 mathematics to solve problems connected to everyday experiences and activities in and outside of school. The student is expected to:*
4.14A	Identify the mathematics in everyday situations.
4.14C	Select or develop an appropriate problem-solving plan or strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem.
4.15	*Underlying processes and mathematical tools.. The student communicates about Grade 4 mathematics using informal language. The student is expected to*
4.15A	Explain and record observations using objects, words, pictures, numbers, and technology.
4.15B	Relate informal language to mathematical language and symbols.

Performance Indicator(s):

Grade 04 Mathematics Unit 04 PI 01

Determine the division facts needed to solve two real-life situations such as the following:

- Ray has 75 nails left in his tool belt. If each board requires 9 nails each, how many boards can he nail? Will Ray have any nails left in his tool belt?
- Suzie paid 36 cents for 4 lollipops. What is the cost of 1 lollipop?

Use a graphic organizer for each problem to record: (1) the fact and solution represented by the situation, (2) a sketch of the solution model, (3) the related fact family, and (4) a justification of the fact family relationship.
Standard(s): 4.4A , 4.4B , 4.4C , 4.6A , 4.14A , 4.14C , 4.15A , 4.15B ELPS ELPS.c.1H , ELPS.c.4I , ELPS.c.5G

Key Understanding(s):

- Division facts can be recalled using a variety of models and strategies including problems in context, patterns in fact families, area models, partitioning, and other known facts.
- The relationship between multiplication and division can be used to develop an efficient procedure to find the quotient for a whole number division problem.
- Fact families and area models can be used to demonstrate the special inverse relationship between multiplication and division, where the product in a multiplication problem is the dividend in a division problem and the two factors in a multiplication problem are the divisor and quotient in a division problem.
- When observing and recording a variety of strategies and mathematical ideas to solve multi-step real-life problems involving multiplication and division, thinking processes are revised, refined, and valued, all which sharpen mathematical understanding.

⚠ Misconception(s):

- Some students may think that a division problem represented using traditional division is read from left-to-right. They may incorrectly write a division number sentence by not placing the dividend first. See below:

$$63\overline{)9}^{\,7}$$

Incorrect	Correct
9 ÷ 63 = 7	63 ÷ 9 = 7

- Some students may think that when given "63 balloons shared by 9 people results in 7 balloons per person" or 63 ÷ 9 = 7, they should record $63\overline{)9}^{\,7}$.
- Some students may think that the placement of zeros in the quotient or dividing process does not affect the value. Students may forget to write zeroes in the quotient or place additional zeros in quotients when not necessary. Have these students always use estimation, and check their answers.

Vocabulary:

- compatible numbers
- dividend
- divisible
- divisor
- factor
- product
- quotient
- remainder

Materials List:

- base-ten blocks (10 100-flats, 10 10-longs, 10 units in each set) (1 set per student, 1 set per teacher) (previously created in Unit 01 Lesson 01 Explore 1)
- base-ten blocks (10 100-flats, 20 10-longs, 40 units in each set) (1 set per student, 1 set per teacher) (previously created)
- base-ten blocks (10 10-longs, 30 units) (1 set per student, 1 set per teacher)
- calculator (basic) (1 per student)
- cardstock (optional) (4 – 5sheets per 2 students, 4 – 5 sheets per teacher)
- commercial money manipulatives (40 – 50 $10 bills, 40 - 50 $100 bills) (1 set per 2 students, 1 set per teacher)
- dry erase marker (1 per student)
- math journal (1 per student)
- plastic zip bag (sandwich sized) (1 per 2 students, 1 per teacher)
- scissors (optional) (1 per teacher)
- whiteboard (student-sized) (1 per student)

Attachments:

All attachments associated with this lesson are referenced in the body of the lesson. Due to considerations for grading or student assessment, attachments that are connected with Performance Indicators or serve as answer keys are available in the district site and are not accessible on the public website.

📄 Just the Facts KEY

📄 Just the Facts

📄 Division Models – Notes

📄 Comic Book Problem KEY

📄 Comic Book Problem

📄 Button Problem KEY

📄 Button Problem

📄 Division with Base-Ten Blocks – Part 1

📄 Tennis Problem KEY

📄 Tennis Problem

📄 Division with Base-Ten Blocks – Part 2

📄 Bead Problem KEY

📄 Bead Problem

📄 Division with Base-Ten Blocks – Zeroes in the Quotient

📄 Zeroes in the Quotient Practice KEY

📄 Zeroes in the Quotient Practice

📄 Play Money_10s_100s

📄 Division with 0 & 1 – Notes

📄 Patterns in Division KEY

📄 Patterns in Division

📄 Division Assessment KEY

📄 Division Assessment

GETTING READY FOR INSTRUCTION

Teachers are encouraged to supplement and substitute resources, materials, and activities to meet the needs of learners. These lessons are one approach to teaching the TEKS/Specificity as well as addressing the Performance Indicators associated with each unit. District personnel may create original lessons using

the Content Creator in the Tools Tab. All originally authored lessons can be saved in the "My CSCOPE" Tab within the "My Content" area.

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
1	**Topics:** • Multiplication and division fact families **<u>Engage 1</u>** Students use experience with fact families to recall division facts. **Instructional Procedures:** 1. Display teacher resource: **Just the Facts** and instruct students to record 2 multiplication and 2 division sentences for each set of numbers in their math journals. Facilitate a class discussion to debrief student responses. 2. Instruct students to label each part of the equations created using the words: factor, product and/or dividend, divisor, and quotient. Remind students that in a multiplication situation, factors are multiplied to make a product and that these terms can also be used to describe a division situation where a product can be divided by one factor to give another factor (e.g., factor x factor = product or $\overset{factor}{factor)\overline{product}}$). 3. Explain to students that this description shows the connection between multiplication and division, however, it is still necessary to name each part of the division sentence as shown below (e.g., dividend ÷ divisor = quotient or $\overset{quotient}{divisor)\overline{dividend}}$). Facilitate a class discussion about the components of a division number sentence. Ask:	⊚ **Spiraling Review** **ATTACHMENTS** • Teacher Resource: **Just the Facts KEY** (1 per teacher) • Teacher Resource: **Just the Facts** (1 per teacher) **MATERIALS** • math journal (1 per student) **TEACHER NOTE** Some students may struggle with the "reading" of a division problem (e.g. they read it from left to right.) Students should be solving division problems in real-life context as much as possible; allowing students to label each number or connect the number with labels when they read the problem aloud.

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	• **What is a dividend?** *Answers may vary. The number to be divided; the total; etc.* • **What is the divisor?** *Answers may vary. The number in the group or the number of groups; the number by which a dividend is divided; etc.* • **What is the quotient?** *Answers may vary. The number of groups (or the number in the groups) plus the remainder; the number (other than the remainder) that is the result of the division operation; etc.* 4. Display the number sentence 7 x 9 = 63 for the class to see. Facilitate a class discussion about how the words dividend, divisor, and quotient play an intricate role in the division process. 9 x 7 = 63 factor factor product 63 ÷ 7 = 9 product factor factor OR 63 ÷ 7 = 9 dividend divisor quotient Ask: • **The product of the multiplication sentence is what part of the related division sentence?** *(dividend or total to be divided)* • **What is meant when it is said that these four number sentences are related?** *Answers may vary. All four number sentences use the same three numbers but in different order; etc.*	

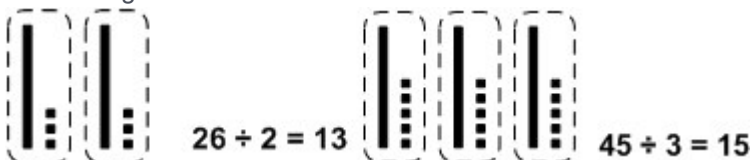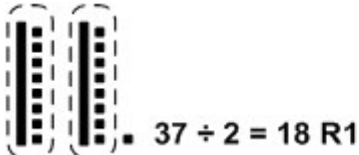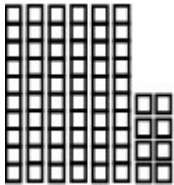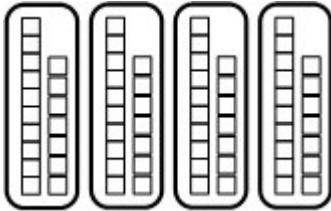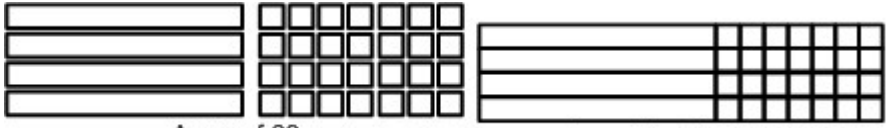| Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	• **What does related mean?** *Answers may vary. It's like a family—everyone is related; etc.* 5. Explain to students that fact families are also related using multiplication and division just as they are in addition and subtraction. Facilitate a class discussion about the relationship between multiplication and division. Ask: • **How can you use related multiplication and division sentences to help you solve a problem?** *(If you know one sentence in a group, then you can solve a related problem using the same three numbers.)* • **How would you describe the relationship between multiplication and division?** *Answers may vary. They are inverse operations; they share the same numbers but in different order; or multiplication joins equal groups together and division separates things into equal groups; etc.* • **How does knowing your multiplication facts or multiples, help you with division problems?** *Answers may vary. You can use what you know about multiplication to find a quotient or answer. For example, if you know 8 x 9 = 72, then you know that 72 ÷ 9 = 8 or 72 ÷ 9 = 8; etc.* 6. Explain to students that when dividing large numbers, they should think of multiplication facts and multiples that can help in the solution process (e.g., If you are calculating 78 ÷ 4, you can think of the equation as ? x 4 = 78. Since 20 x 4 = 80, the quotient must be less than 80.).	
	Topics: • Base-ten models for division	**ATTACHMENTS** • Handout (optional): **Division Models – Notes**

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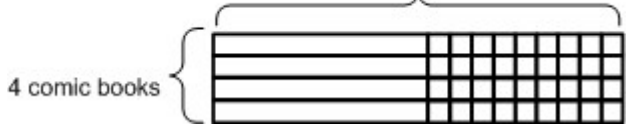| Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	Explore/Explain 1 Students use base-ten models to investigate division. **Instructional Procedures:** 1. Prior to instruction, add 10 10-longs and 30 units to each set of previously created base-ten blocks to create a new set of base-ten blocks for each student and each teacher with 10 100-flats, 20 10-longs, and 40 units. 2. Distribute a set of base-ten blocks, a whiteboard, and a dry erase marker to each student. 3. Display the following problem situation for the class to see: **I have 42 oranges that I need to put in 3 boxes. How many oranges will go in each box?** 4. Instruct students to use their base-ten blocks to create a model of 42,separate the model of 42 into 3 equal groups, and draw a diagram of their results on their whiteboard. Allow time for students to complete the activity. Monitor and assess students to check for understanding. Facilitate a class discussion to debrief student solutions. $42 \div 3 = 14$ Ask: • **How did you separate 42 into 3 equal groups?** *Answers may vary. Count out blocks*	(1 per student) **MATERIALS** • base-ten blocks (10 100-flats, 10 10-longs, 10 units in each set) (1 set per student, 1 set per teacher)(previously created in Unit 01 Lesson 01 Explore 1) • base-ten blocks (10 10-longs, 30 units) (1 set per student, 1 set per teacher) • whiteboard (student-sized) (1 per student) • dry erase marker (1 per student) • math journal (1 per student) **TEACHER NOTE** The handout (optional): **Division Models – Notes** may be used to guide students through modeling division with base-ten blocks. As you question students about the processes they are using with their models, instruct them to show how they can record each step by using this "distributive" division procedure. This procedure "distributes-out" each part of the quotient as the students determine what factor

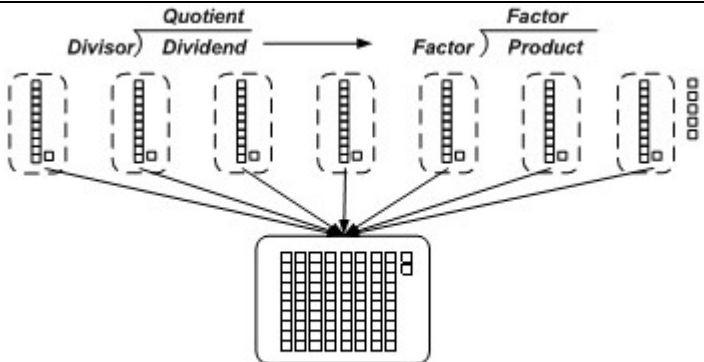| Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	into three groups; regroup blocks so every group had the same (fair share); "subtracting" repeatedly into 3 groups; etc. • **What is the relationship between subtraction and division?** *Answers may vary. When I separated the blocks into 3 groups, I used repeated subtraction; etc.* • **How many groups of 10-longs did each group get?** *(1)* • **How many groups of units did each group get?** *(4)* • **What division problem represents 42 separated into 3 equal groups?** *(42 ÷ 3)* • **How can you write 42 divided by 3?** *(42 ÷ 3 or* $3\overline{)42}$ *)* • **Did all of the blocks fit into the groups you made? Explain.** *(yes) Answers may vary. They all fit because 42 is divisible by 3; 3 is a factor of 42; etc.* 5. Display the following problem situations for the class to see: **I have 26 oranges that I need to put in 2 boxes. How many oranges will go in each box?** **I have 45 oranges that I need to put in 3 boxes. How many oranges will go in each box?** 6. Instruct students to repeat the process of creating a model with base-ten blocks, separating the model into a given number of groups, and drawing a diagram of their results on their whiteboard. Allow time for students to model each problem. Monitor and assess students to check for understanding. 26 ÷ 2 = 13 45 ÷ 3 = 15	to use when multiplying the dividend.

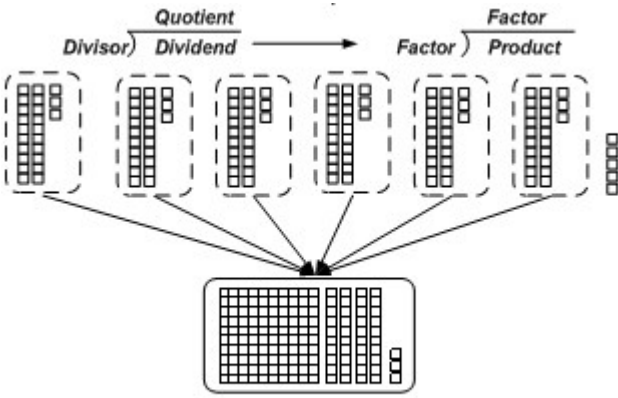| Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	7. Display the following problem situations for the class to see: **I have 57 oranges that I need to put in 4 boxes. How many oranges will go in each box?** 8. Instruct students to use their base-ten blocks to create a model of 57, separate the model of 57 into 4 equal groups, and draw a diagram of their results on their whiteboard. Allow time for students to model each problem. Monitor and assess students to check for understanding. Facilitate a class discussion to debrief student solutions. Ask: • **Did all of the blocks fit into the groups you made? Explain.** *(no) Answers may vary. They did not all fit because 57 is not evenly divisible by 4; 4 is not a factor of 57; etc.* • **Which blocks did <u>not</u> fit into the groups you made? Why or why not?** *(I had 1 block that would not fit because it was "left over" or it was the "remainder.")* $57 \div 4 = 14 \text{ R} 1$ 9. Display the following problem situations for the class to see: **I have 37 oranges that I need to put in 2 boxes. How many oranges will go in each box?** **I have 51 oranges that I need to put in 4 boxes. How many oranges will go in each box?** 10. Instruct students to repeat the process of creating a model with base-ten blocks, separating the model into a given number of groups, and draw a diagram of their results on their	

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	whiteboard. Allow time for students to model each problem. Monitor and assess students to check for understanding. 11. Place students in pairs. Instruct student pairs to discuss what division means and to record their definitions into their math journal. Allow time for students to complete the activity. Monitor and assess students to check for understanding. Facilitate a class discussion regarding student journal entries. Ask: • **What is division?** *Answers may vary. One of the four basic operations of arithmetic, where in the division statement a ÷ b = c, where a is the dividend, b the divisor, and c is the quotient; a problem where things are separated into equal groups; etc.*	
2	**Topics:** • Base-ten models for division **Explore/Explain 2** Students use base-ten models to investigate division in problem situations with and without remainders. **Instructional Procedures:**	⊚ **Spiraling Review** **ATTACHMENTS** • Teacher Resource: **Comic Book Problem KEY** (1 per teacher) • Teacher Resource: **Comic Book Problem** (1 per teacher)

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Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	1. Display teacher resource: **Comic Book Problem**. 2. Place students in pairs and distribute a set of base-ten blocks and handout: **Comic Book Problem** to each student. Instruct student pairs to use their base-ten blocks to model the total value of the comic books. (*$68*) 3. Instruct pairs to formulate a plan on how to model the cost of each comic book using their base-ten blocks and record a model of their plan on their handout: **Comic Book Problem**. Ask: • **What do the base-ten blocks represent in your problem?** *(The $68 that needs to be divided into equal groups.)* • **How did you use base-ten blocks to represent this problem? What did you do first? Second? etc.?** *Answers may vary. I knew that three of the 10-longs could not be equally divided into 4 groups. So, I traded the 3 10-longs for 30 units. Then, I divided the 30 units*	• Handout: **Comic Book Problem** (1 per student) • Teacher Resource: **Button Problem KEY** (1 per teacher) • Teacher Resource: **Button Problem** (1 per teacher) • Handout: **Button Problem** (1 per student) • Teacher Resource: **Division with Base-Ten Blocks – Part 1** (1 per teacher) • Handout (optional): **Division with Base-Ten Blocks – Part 1** (1 per student) • Teacher Resource: **Tennis Problem KEY** (1 per teacher) • Teacher Resource: **Tennis Problem** (1 per teacher) • Handout: **Tennis Problem** (1 per student) • Teacher Resource: **Division with Base-Ten Blocks – Part 2** (1 per teacher) • Handout: **Division with Base-Ten Blocks – Part 2** (1 per student) • Teacher Resource: **Bead Problem KEY** (1 per teacher) • Handout: **Bead Problem** (1 per student)

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	into 4 equal groups which made 7 units in each group. That left us with one 10-long and 7 units in each group; etc. • **Based on your model, how much is each comic book worth?** *($17)* • **How could you verify that your solution is reasonable?** *Answers may vary. I could use multiplication to see if 4 groups of $17 equal $68; etc.* • **How could you create an array or area model to represent the solution to the problem?** *Answers may vary. I could group just the tens together and then the units to see if I could form a rectangle; etc.* • **Could you use your array to check your multiplication answer? Why or why not?** *(yes) Answers may vary. I could arrange 4 groups of 17 into an array to see if the array represents 68; etc.* 4. Instruct student pairs to rearrange their base-ten block model of 68 into an array. Model the process of converting the array into an area model. Combine tens and ones into a rectangle for the class to see. Array of 68 Area Model of 68 Ask: • **How could you label this area model to represent the Comic Book Problem?** *Answers may vary.*	**MATERIALS** • base-ten blocks (10 100-flats, 20 10-longs, 40 units in each set) (1 set per student, 1 set per teacher)(previously created) **TEACHER NOTE** The handout (optional): **Division with Base-Ten Blocks – Part 1** and handout (optional): **Division with Base-Ten Blocks – Part 2** may be used to assist students who have difficulty building the base-ten division models.

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	17 dollars per comic book 4 comic books 5. Instruct student pairs to complete the "Words" and "Numbers" portion of their handout: **Comic Book Problem**. Allow time for students to complete each section. Monitor and assess students to check for understanding. 6. Display teacher resource: **Button Problem** and distribute handout: **Button Problem** to each student. Instruct student pairs to use their base-ten blocks to model the total number of buttons. *(82)* 7. Remind students that in the previous example, they looked at how to model and interpret a division problem using base-ten blocks. Explain to students that now they will connect the model of the division process to the division algorithm also known as a "place value" division procedure. 8. Using the displayed teacher resource: **Division with Base-Ten Blocks – Part 1**, demonstrate how to model the division process with base-ten blocks and with numbers. Instruct students to replicate the model and to complete the "Words" and "Numbers" portion of their handout: **Button Problem**.	

Suggested Day	Suggested Instructional Procedures	Notes for Teacher

Quotient x Divisor (+ Remainder) = Dividend

(7 shirts x 11 buttons) + 5 leftover buttons = 82 buttons

Ask:

- **How can you justify this solution?** *Answers may vary. I can multiply the quotient by the divisor to see if it equals the dividend; etc.*
- **How do you know your answer is reasonable?** *Answers may vary. Because 11 buttons is close to 10 buttons, and 7 shirts x 10 buttons = 70 buttons, which is close to 82 buttons; etc.*

9. Display teacher resource: **Tennis Problem** and distribute handout: **Tennis Problem** to each student. Instruct students use their base-ten blocks to individually model the total number of tennis balls. *(143*)

10. Using the displayed teacher resource: **Division with Base-Ten Blocks – Part 2**, demonstrate how to model the division process with base-ten blocks and with numbers. Instruct students to replicate the model and to complete the "Words" and "Numbers" portion of | |

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Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	their handout: **Tennis Problem**. Ask: **How can you justify this solution?** *Answers may vary. I can multiply the quotient by the divisor to see if it equals the dividend; etc.* **How do you know your answer is reasonable?** *Answers may vary. Because 23 tennis balls is close to 20 tennis balls, and 20 tennis balls x 6 players = 120 tennis balls, which is close to 143 tennis balls; etc.* 11. Distribute handout: **Bead Problem** to each student. Instruct students to complete the handout as independent practice or homework.	
3	**Topics:** Base-ten models for division	⊚ **Spiraling Review**

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Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	Explore/Explain 3 Students use base-ten models to investigate division in problem situations with zeroes in the quotient. **Instructional Procedures:** 1. Facilitate a class discussion to debrief and discuss previously assigned handout: **Bead Problem**. Ask: • **Sharon and her 6 friends are using beads to make bracelets. She has 228 beads to share. How many beads will Sharon and each of her friends get? Are there any beads leftover? How many?** *(32; yes; 4)* • **How was this problem different from the other division problems you have worked on?** *(I had to include Sharon in the problem and divide by groups of 7.)* 2. Present the following question to the class: Have you ever had someone hold your place in line? Explain to students that some people are professional placeholders. These people stand in line in Washington D.C. for lobbyists, at passport offices, ticket lines, etc. and then, they turn over their places to their employers at the last minute. 3. Place students in groups of 4. Instruct students to spend a few minutes in their groups discussing people who might "hold someone else's place." Ask: • **What are some examples of other people who might hold someone else's place?**	**ATTACHMENTS** • Handout: **Division with Base-Ten Blocks – Zeroes in the Quotient** (1 per student) • Teacher Resource: **Zeroes in the Quotient Practice KEY** (1 per teacher) • Handout: **Zeroes in the Quotient Practice** (1 per student) **MATERIALS** • base-ten blocks (10 100-flats, 20 10-longs, 40 units in each set) (1 set per 2 students, 1 set per teacher) (previously created)

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Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	Answers may vary. Substitute teacher; movie-actor stunt man; baby-sitter; etc.	
	4. Place students in pairs and distribute a set of base-ten blocks to each pair. Display the division problem 930 ÷ 9 for the class to see. Instruct student pairs to model this division problem with their base-ten blocks. Allow time for students to complete their model. Monitor and assess student pairs to check for understanding.	
	5. Distribute handout: **Division with Base-Ten Blocks – Zeroes in the Quotient**. Demonstrate the solution process for 930 ÷ 9 with base-ten blocks to model why the 0 in the quotient is so important. Instruct students to replicate the model with their base-ten blocks. Ask: • **Did you have enough 10-longs?** *(no)* **What did you do?** *(I only had three 10-longs and needed nine. So I had to trade for units in order to share.)* • **How can you represent "no tens" symbolically?** *(with a "0")* Remind students of the importance of using a 0 as a place holder in a quotient. 6. Distribute handout: **Zeroes in the Quotient Practice** to each student. Instruct students to complete the practice problems and the graphic organizer independently. Allow time for students to complete the handout. Monitor and assess students to check for understanding. Facilitate a class discussion about the student models and solutions.	
4	**Topics:** • Division patterns for 10 and 100 • Division with 0 and 1	⊚ **Spiraling Review** **ATTACHMENTS**

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Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	Explore/Explain 4 Students use 10- and 100-dollar bills to model patterns for 10 and 100 in division. Students investigate division with 0 and 1. **Instructional Procedures:** 1. Prior to instruction, create a Bag of Play Money $10 & $100 Bills for every 2 students and a Bag of Play Money $10 & $100 Bills for each teacher by placing 40 – 50 $10 and $100 bills in a plastic zip bag. If commercial money manipulatives are not available, use teacher resource (optional): **Play Money$10 & $100 Bills** to create a Bag of Play Money $10 & $100 Bills by copying on cardstock, cutting apart, laminating, and placing in a plastic zip bag. 2. Remind students that they learned to multiply by multiples of 10 and 100. Display the following multiplication number sentences for the class to see: $6 \times 3 = 18$ $6 \times 30 = ?$ $6 \times 300 = ?$ 3. Instruct students to find the product of each displayed multiplication number sentence and record each problem and solution in their math journal. Ask: • **What pattern do you see?** *Answers may vary. When a zero is added to a factor, a zero is also added to the product; etc.* • **How could you write division number sentences using these facts?** *(18 ÷ 6 = 3; 180 ÷ 6 = 30; 1800 ÷ 6 = 300)*	• Teacher Resource (optional): **Play Money $10 & $100 Bills** (1 set per 2 students, 1 set per teacher) • Handout (optional): **Division with 0 & 1 – Notes** (1 per student) **MATERIALS** • commercial money manipulatives (40 – 50 $10 bills, 40 - 50 $100 bills) (1 set per 2 students, 1 set per teacher) • plastic zip bag (sandwich sized) (1 per 2 students, 1 per teacher) • cardstock (optional) (4 – 5sheets per 2 students, 4 – 5 sheets per teacher) • scissors (optional) (1 per teacher) • calculator (basic) (1 per student) • math journal (1 per student) **TEACHER NOTE** For patterning purposes, 4-digit dividends are addressed in this lesson even though Grade 4 TEKS limit actual problem solving to 3-digit dividends.

Suggested Day	Suggested Instructional Procedures	Notes for Teacher

	4. Place students in groups of 4. Distribute a Bag of Play Money $10 & $100 Bills to each group and a calculator to each student.
	
	5. Display the following division fact for the class to see: 150 ÷ 3. Instruct student groups to count out 15 play $10 bills from their Bag of Play Money $10 & $100 Bills and divide the bills according to the divisor in the problem. Allow time for students to complete the activity. Monitor and assess student groups to check for understanding. Facilitate a class discussion about the solution process.
	Ask:
	
	  • **How could you record the problem you just demonstrated with the $10 bills?** *($150 ÷ 3 = $50 or 15 tens ÷ 3 = 5 tens)*
	  • **How could you enter this equation on the calculator?** *(150 ÷ 3 =)*
	
	   Instruct students to enter the equation in their calculator to justify their solution.
	
	6. Display 5 additional division facts for the class to see. Instruct groups to repeat the process of counting out the appropriate number of $10 bills from their Bag of Play Money $10 & $100 bills, dividing the bills according to the divisor in the problem, recording each problem and solution in their math journal, and using their calculator to justify their solution.
	Ask:
	
	  • **What is the relationship between a dividend that is a multiple of 10 (represented by the $10 bill) and the quotient?** *Answers may vary. When dividends are multiples of 10, quotients are also multiples of 10; etc.*
	  • **Could this rule work for $100 bills? Explain.** *(Yes, when dividends are multiples of 100,*
		TEACHER NOTE
		Instruct struggling students to circle the divisor and the part of the dividend that makes one basic fact in one color and then underline the extra zero in a second color. After they find the basic fact quotient, students can multiply the number by 10.
		
		Also, for students who are still having trouble with basic facts in general, instruct them to draw models, such as arrays to show the division facts. Multiplication charts may also be brought out to review basic facts for multiplication and division. Students who use a multiplication chart should focus on the divisor when searching for a compatible number.
		
		TEACHER NOTE
		When students find basic fact patterns, such as multiples of 10 they are essentially finding numbers that are easy to compute mentally also known as "compatible numbers."

Enhanced Instructional Transition Guide

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	quotients are also multiples of 100.)	**ADDITIONAL PRACTICE** The handout (optional): **Division with 0 & 1 – Notes** may be used to demonstrate division with 0 and 1.

7. Instruct student groups to repeat the activity with $100 bills using the same 5 displayed division facts. Remind students to record each problem and solution in their math journal and use their calculator to justify their solution (e.g., $1500 ÷ 3 = 500, etc.).

8. Explain to students that when the divisor remains the same, increased dividends give overestimates, and decreased dividends give underestimates.

9. Display the following multiplication number sentence for the class to see:

$$7 \times 4 = 28$$
$$7 \times 40 = 280$$
$$7 \times 400 = 2800$$

10. Instruct students to record the related division number sentences in their journals for each of the displayed multiplication number sentences and describe the patterns they see. Allow time for students to record their division number sentences and descriptions. Monitor and assess students to check for understanding. Facilitate a class discussion to debrief student solutions.
    Ask:

    - **What is the related division number sentence to 7 x 4 = 28? 7 x 40 = 280? 7 x 400 = 280?** *(28 ÷ 4 = 7; 280 ÷ 40 = 7; 2800 ÷ 400 = 7)*
    - **What patterns do you see in these related division number sentences?** *Answers may vary. The number of zeroes in the dividend is the same as the number of zeroes in the quotient; etc.*

Enhanced Instructional Transition Guide

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
5	**Topics:** • Division patterns **Elaborate 1** Students investigate patterns in division. **Instructional Procedures:** 1. Display the following division problems for the class to see: $$240 \div 4 = ?$$ $$280 \div 4 = ?$$ $$320 \div 4 = ?$$ 2. Distribute a whiteboard and dry erase marker to each student. Instruct students to use their whiteboards to find the quotient for each problem. Allow time for students to complete each problem. Ask: • **What kinds of patterns do you see in these problems?** *Answers may vary. As the dividend increased, the quotient also increased; all the front-end digits of each dividend are divisible by 4, and you just write a zero in the one's place to get the quotient; etc.* 3. Place students in pairs and distribute handout: **Patterns in Division** to each student. Instruct pairs to look for patterns as they find the missing numbers in each table on their handout. Allow time for students to complete the activity. Monitor and assess student pairs to check for understanding. Facilitate a class discussion to debrief student solutions and patterns.	**Spiraling Review** **ATTACHMENTS** • Teacher Resource: **Patterns in Division KEY** (1 per teacher) • Handout: **Patterns in Division** (1 per student) • Teacher Resource: **Division Assessment KEY** (1 per teacher) • Handout: **Division Assessment** (1 per student) **MATERIALS** • math journal (1 per student) • whiteboard (student-sized) (1 per student) • dry erase marker (1 per student)

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	4. Distribute handout: **Division Assessment** to each student. Instruct students to complete the handout as independent practice or homework.	
6	**Evaluate 1** **Instructional Procedures:** 1. Facilitate a class discussion to debrief and discuss previously assigned handout: **Division Assessment**. 2. Assess student understanding of related concepts and processes by using the Performance Indicator(s) aligned to this lesson. **Performance Indicator(s):**	

Enhanced Instructional Transition Guide

Suggested Day	Suggested Instructional Procedures	Notes for Teacher
	Grade4 Mathematics Unit04 PI01 Determine the division facts needed to solve two real-life situations such as the following: • Ray has 72 nails left in his tool belt. If each board requires 9 nails each, how many boards can he nail? • Suzie paid 36 cents for 4 lollipops. What is the cost of 1 lollipop? Use a graphic organizer for each problem to record: (1) the fact and solution represented by the situation, (2) a sketch of the solution model, (3) the related fact family, and (4) a justification of the fact family relationship. Standard(s): 4.4A , 4.4B , 4.4C , 4.6A , 4.14A , 4.14C , 4.15A , 4.15B ELPS ELPS.c.1H , ELPS.c.4I , ELPS.c.5G	

04/02/2013

Just the Facts KEY

Write four number sentences (2 multiplication and 2 division) for each set of numbers below.

9	63
7	

4	72
18	

6	23
138	

9 x 7 = 63; 7 x 9 = 63; 63 ÷ 9 = 7; 63 ÷ 7 = 9

4 x 18 = 72; 18 x 4 = 72; 72 ÷ 4 = 18; 72 ÷ 18 = 4

6 x 23 = 138; 23 x 6 = 138; 138 ÷ 6 = 23; 138 ÷ 23 = 6

Just the Facts

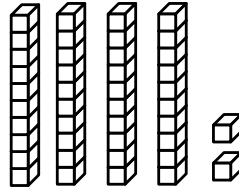Write four number sentences (2 multiplication and 2 division) for each set of numbers below.

9		**63**
	7	

4		**72**
	18	

6		**23**
	138	

Division Models – Notes

Division – No Remainder

| **Model** | **Record "Distributive" Division Procedure** |

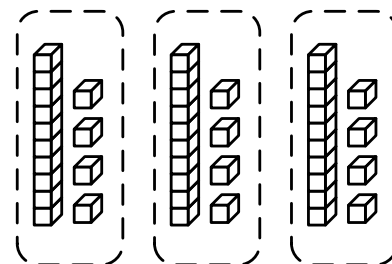**(1) Lay out the blocks to model the dividend 42.**

$$3\overline{)42}$$

(2) Separate the tens into 3 equal groups.

$$
\begin{array}{r}
10 \\
3\overline{)42} \\
-30 \\
\hline
12
\end{array}
$$

1 ten in each group
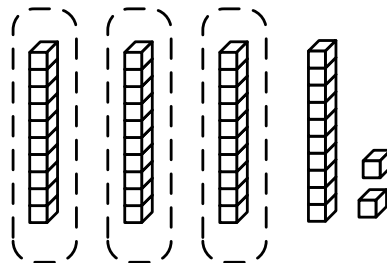
3 tens used

(3) Regroup 1 ten and 2 ones as 12 ones.

$$
\begin{array}{r}
14 \\
\overbrace{10+4} \\
3\overline{)42} \\
-30 \\
\hline
12 \\
-12 \\
\hline
0
\end{array}
$$

12 ones used

0 left

(4) Place an equal number of ones into each group.

So, 42 ÷ 3 = 14 is 3 groups of 14

Division Models – Notes

Division – With Remainders

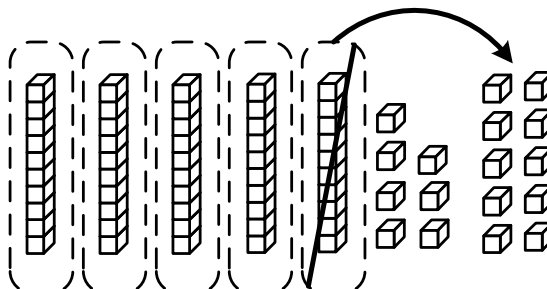|	**Model**	**Record "Distributive" Division Procedure**

(1) Lay out the blocks to model the dividend 57.

$$4 \overline{)\ 57}$$
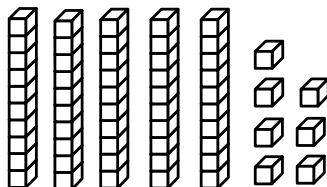
(2) Separate the tens into 4 equal groups.

$$\begin{array}{r} 10 \\ 4 \overline{)\ 57} \\ -40 \\ \hline 17 \end{array}$$

1 ten in each group
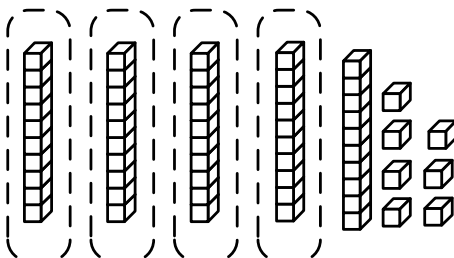
4 tens used

(3) Regroup 1 ten and 7 ones as 17 ones.

$$\begin{array}{r} 14 \quad R1 \\ \overline{10 + 4} \\ 4 \overline{)\ 57} \\ -40 \\ \hline 17 \\ -16 \\ \hline 1 \end{array}$$

16 ones used

1 left

(4) Place an equal number of ones into each group.

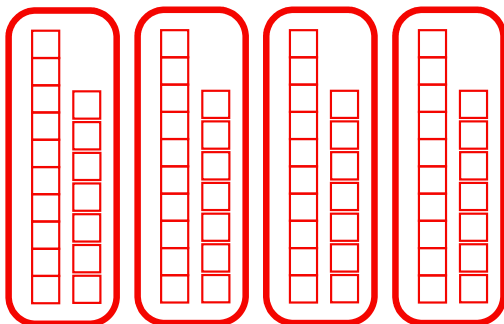So, 57 ÷ 4 = 14 R1 or 4 groups of 14 with 1 unit leftover

Comic Book Problem **KEY**

- Use base-ten blocks to solve this problem.
- Discuss and agree on your plans with your partner.
- Carry out your plan with your partner.
- Use the table to record your process.

Mark has comic books that are worth $68. He has 4 comic books. They are each worth the same amount. How much is each book worth?

Model:

Words:

68 dollars divided equally among 4 comic books equals 17 dollars

Numbers:

68 dollars ÷ 4 comic books = 17 dollars per comic book.

$$\frac{68 \text{ dollars}}{4 \text{ comic books}} = 17 \text{ dollars per comic book}$$

$$4 \text{ comic books} \overline{)68 \text{ dollars}} \quad 17 \text{ dollars per comic book}$$

Comic Book Problem

- Use base-ten blocks to solve this problem.
- Discuss and agree on your plans with your partner.
- Carry out your plan with your partner.
- Use the table to record your process.

Mark has comic books that are worth $68. He has 4 comic books. They are each worth the same amount. How much is each book worth?

Model:
Words:
Numbers:

Button Problem KEY

- Use base-ten blocks to solve this problem.
- Discuss and agree on your plans with your partner.
- Carry out your plan with your partner.
- Use the table to record your process.

Jen wants to replace the buttons on 7 of her school uniform shirts. She has a package of 82 buttons. If each shirt has the same number of buttons, what is the maximum number of buttons she can replace on each shirt? How many will be leftover?

Model:

Words:

82 buttons divided among 7 shirts equals 11 buttons/shirt with 5 buttons leftover

Numbers:

82 buttons ÷ 7 shirts = 11 buttons/shirt with 5 buttons leftover.

$$7 \text{ shirts} \overline{)\,82 \text{ buttons}} \quad 11 \text{ buttons/shirt with 5 buttons leftover}$$

$$\frac{82 \text{ buttons/package}}{7 \text{ shirts}} = 11 \text{ buttons/shirt with 5 buttons leftover}$$

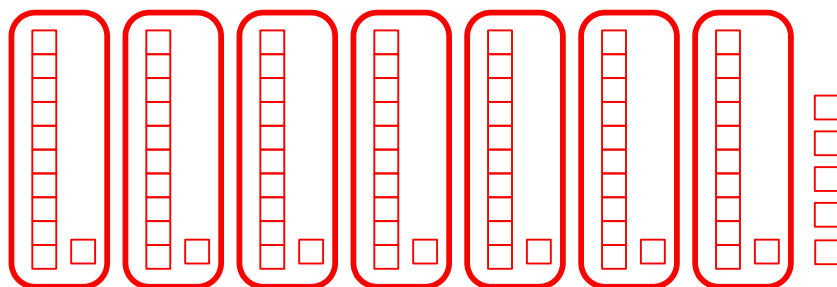# Button Problem

- Use base-ten blocks to solve this problem.
- Discuss and agree on your plans with your partner.
- Carry out your plan with your partner.
- Use the table to record your process.

Jen wants to replace the buttons on 7 of her school uniform shirts. She has a package of 82 buttons. If each shirt has the same number of buttons, what is the maximum number of buttons she can replace on each shirt? How many will be leftover?

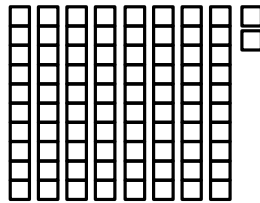| **Model:** |
| --- |
| |
| **Words:** |
| |
| **Numbers:** |
| |

Division with Base-Ten Blocks – Part 1

Problem:

Jen wants to replace the buttons on 7 of her school uniform shirts. She has a package of 82 buttons. If each shirt has the same number of buttons, what is the maximum number of buttons she can replace on each shirt? How many will be leftover?

(1)   Model total number of buttons with base-ten blocks:

(2)   Separate the tens:

$$\begin{array}{r} 10 \\ 7{\overline{\smash{\big)}\,82}} \\ -70 \\ \hline 10 \end{array}$$

← 7 groups of 1 ten can be separated out of 8 tens

← 1 ten is in each circled group. There are 7 groups. So, 7 x 1 ten = 7 tens. When we subtract these tens from the original 8 tens, we have 1 ten left over.

Division with Base-Ten Blocks – Part 1

(3)   Rename the leftover ten:

$$\begin{array}{r} 10 \\ 7{\overline{\smash{\big)}\,82}} \\ -70 \\ \hline 12 \end{array}$$

← 7 groups of 1 ten can be separated out of 8 tens

← Rename the 1 ten leftover as 10 units and join these units with the 2 units we already have. Now we have 12 units to divide into 7 equal groups.
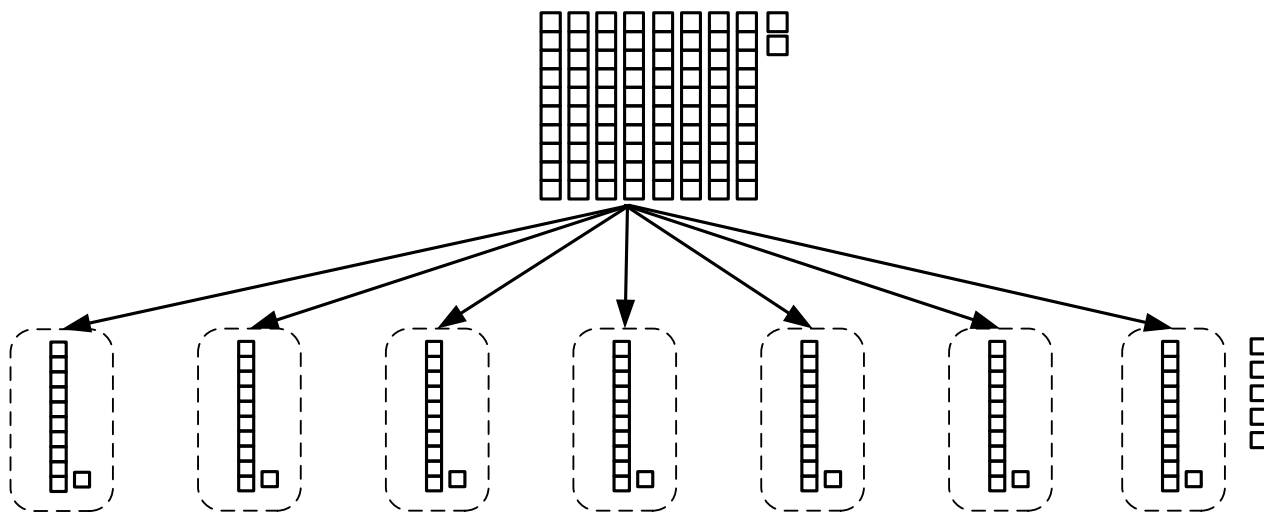
(4)   Separate the ones:

$$\begin{array}{r} \textbf{11 R5} \\ \overline{10 + 1} \\ 7{\overline{\smash{\big)}\,82}} \\ -70 \\ \hline 12 \\ -7 \\ \hline 5 \end{array}$$

7 groups of 11 and 5 units leftover equals 82

← 1 unit is in each circled group. There are 7 groups. So, 1 x 7= 7 ones . When we subtract the ones from the original 12, we have 5 ones left over.

Division with Base-Ten Blocks – Part 1

(5)   How can this solution be represented with numbers?

82 buttons ÷ 7 shirts = 11 buttons with 5 buttons leftover

$$\overset{\textit{11 buttons with 5 buttons leftover}}{\textit{7 shirts} \,)\,\overline{\textit{82 buttons}}}$$

$$\frac{\textit{82 buttons}}{\textit{7 shirts}} \;=\; \textit{11 buttons/shirt with 5 buttons leftover}$$

Tennis Problem KEY
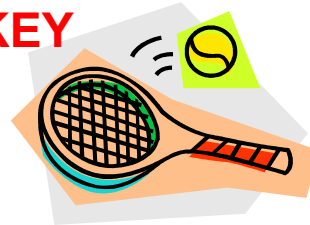
- Use base-ten blocks to solve this problem.
- Discuss and agree on your plans with your partner.
- Carry out your plan with your partner.
- Use the table to record your process.

A tennis coach has 143 tennis balls. There are 6 members on the tennis team. If the coach divides the tennis balls evenly, how many balls does each member get?

Model:

Words:

143 tennis balls divided among 6 team members equals 23 tennis balls per player with 5 leftover

Numbers:

143 tennis balls ÷ 6 players = 23 tennis balls per player with 5 balls leftover

$$6 \text{ players} \overline{\smash{\big)}\, 143 \text{ tennis balls}} \quad 23 \text{ tennis balls per player with 5 balls leftover}$$

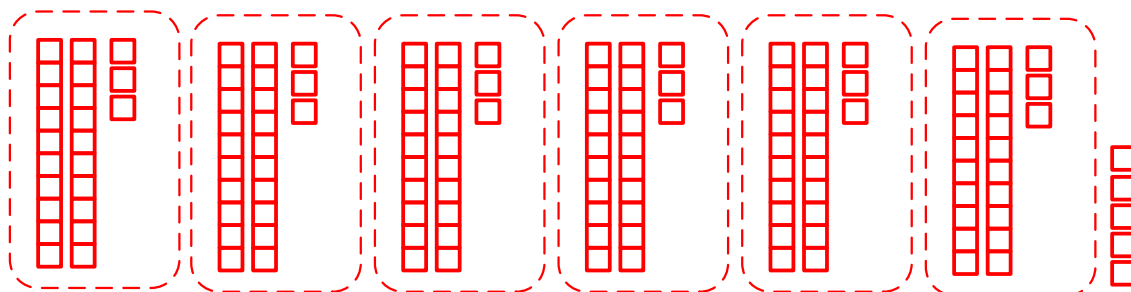$$\frac{143 \text{ tennis balls}}{6 \text{ players}} = 23 \text{ tennis balls per player with 5 balls leftover}$$

Tennis Problem
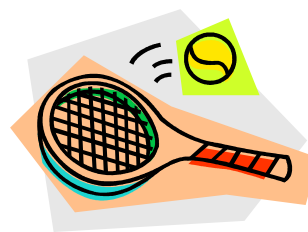
- Use base-ten blocks to solve this problem.
- Discuss and agree on your plans with your partner.
- Carry out your plan with your partner.
- Use the table to record your process.

A tennis coach has 143 tennis balls. There are 6 members on the tennis team. If the coach divides the tennis balls evenly, how many balls does each member get?

Model:

Words:

Numbers:

Division with Base-Ten Blocks – Part 2

Problem:

A tennis coach has 143 tennis balls. There are 6 members on the tennis team. If the coach divides the tennis balls evenly, how many balls does each member get?
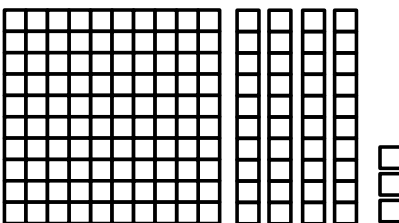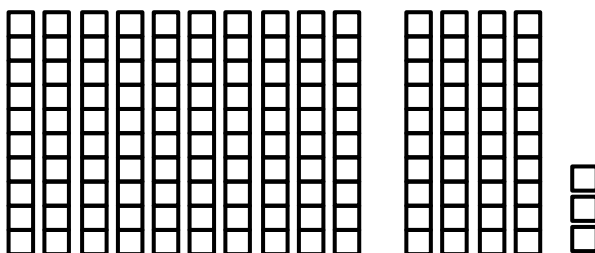
(1)   Model total number of tennis balls with base-ten blocks:

(2)   Separate the hundreds into 10 tens:

$$6\overline{)143}$$

Now there are 14 tens to divide into equal groups.

Division with Base-Ten Blocks – Part 2

(3)   Separated the tens into 6 equal groups:

$$\begin{array}{r} 20 \\ 6{\overline{\smash{\big)}\,143}} \\ -120 \\ \hline 23 \end{array}$$

We can separate the tens into 6 equal groups of 20.

2 groups of ten with 3 units remaining

(4)   Rename the leftover tens:

$$\begin{array}{r} 20 \\ 6{\overline{\smash{\big)}\,143}} \\ -120 \\ \hline 23 \end{array}$$

Rename the 2 tens leftover as 20 ones and add the 3 ones we already have to get 23 ones.

Division with Base-Ten Blocks – Part 2

(5)   Separate the ones into the 6 equal groups:

23   R5

$\overbrace{20 + 3}$

6 groups of 23 and 5 units leftover equals 143

6)143
−120
23
−18
05

3 ones are placed into each of the 6 groups. So, 6 x 3 = 18 ones. We have 5 ones leftover.

(6)   How can this solution be represented with numbers?
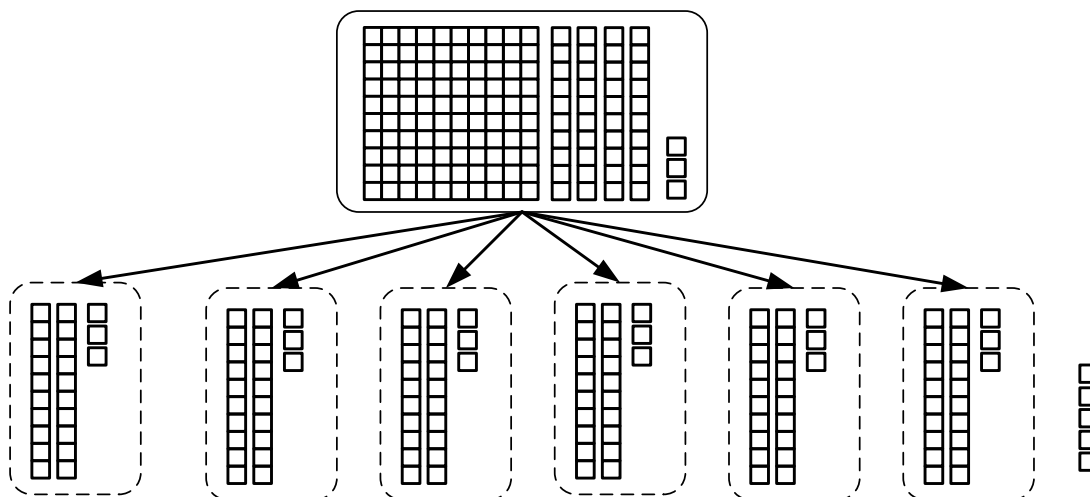
143 tennis balls ÷ 6 players = 23 tennis balls per player with 5 balls leftover

23 tennis balls per player with 5 balls leftover
6 players) 143 tennis balls

$$\frac{143 \text{ tennis balls}}{6 \text{ players}} = 23 \text{ tennis balls per player with 5 balls leftover}$$

Bead Problem KEY

- Use base-ten blocks to solve this problem.
- Discuss and agree on your plans with your partner.
- Carry out your plan with your partner.
- Use the table to record your process.
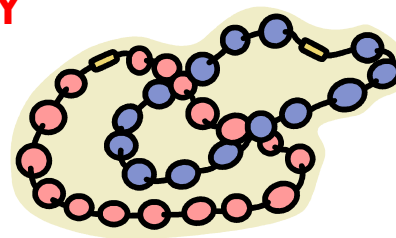
Sharon and her 6 friends are using beads to make bracelets. She has 228 beads to share. How many beads will Sharon and each of her friends get?

Model:

Words:

228 beads divided among 7 friends equals 32 beads per friend with 4 beads leftover

Numbers:

228 beads ÷ 7 friends = 32 beads per friend with 4 beads leftover

$$7 \text{ friends} \overline{)\,228 \text{ beads}} \quad = 32 \text{ beads per friend with 4 beads leftover}$$

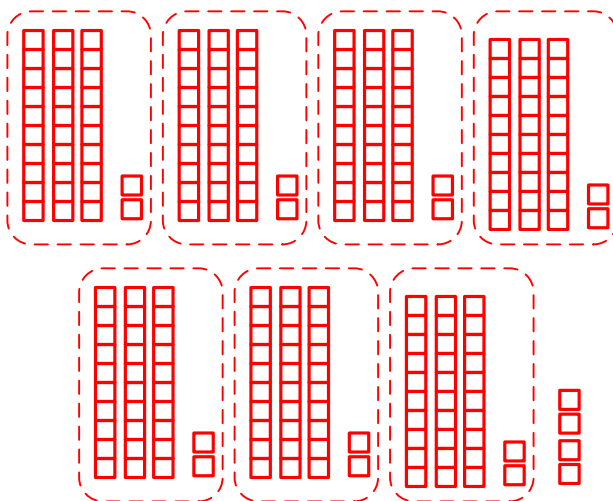$$\frac{228 \text{ beads}}{7 \text{ friends}} = 32 \text{ beads per friend with 4 beads leftover}$$

Bead Problem
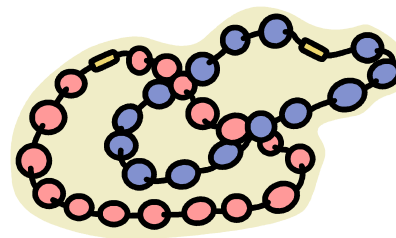
- Use base-ten blocks to solve this problem.
- Discuss and agree on your plans with your partner.
- Carry out your plan with your partner.
- Use the table to record your process.

Sharon and her 6 friends are using bead to make bracelets. She has 228 beads to share. How many beads will Sharon and each of her friends get?

Model:

Words:

Numbers:

Division with Base-Ten Blocks – Zeroes in the Quotient

Problem: **930 ÷ 9**

(1)   Model the dividend with base-ten blocks:
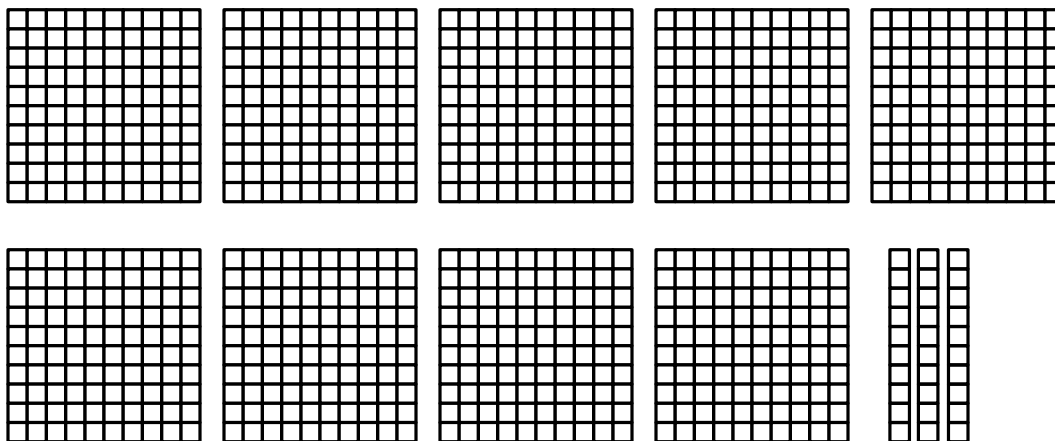
(2)   Separate the hundreds:
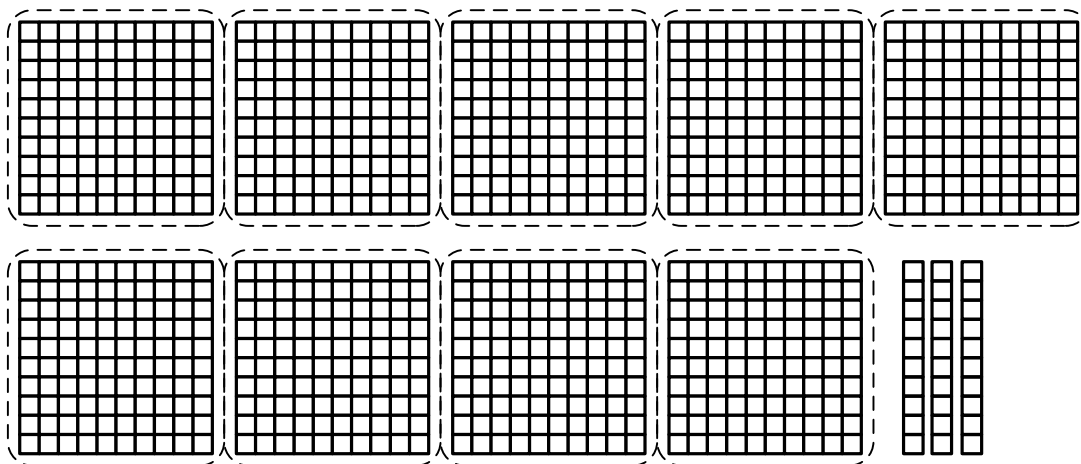
$$9 \overline{)930}$$

Now there are 9 hundreds to divide into 9 equal groups.

Division with Base-Ten Blocks – Zeroes in the Quotient

(3) Rename the tens:
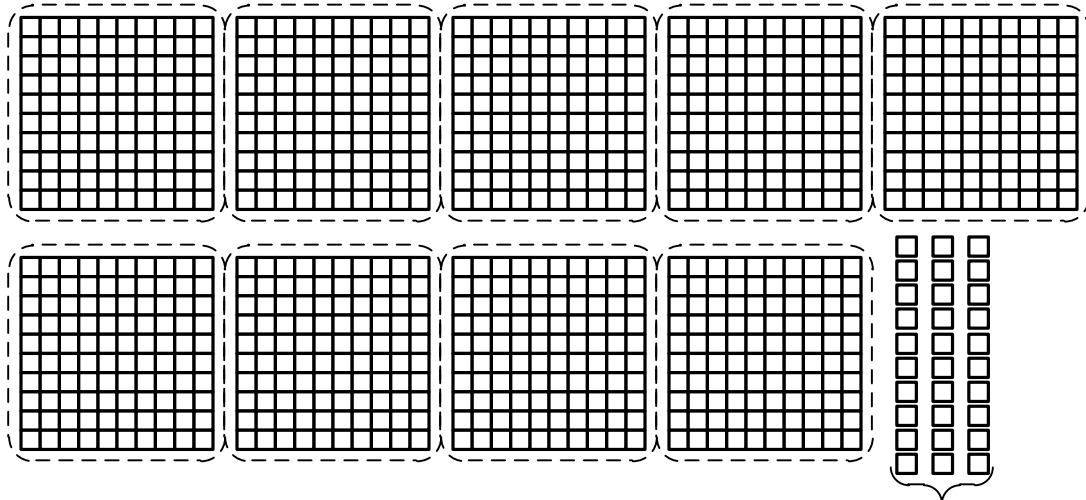
$$\begin{array}{r} 100 \\ 9\overline{)930} \\ -900 \\ \hline 30 \end{array}$$

We can separate the hundreds into 9 equal groups of 100.

3 groups of ten remain. So, we rename these as 30 ones. There are no ones to join with the 30 ones we just created. So, there are 30 ones to divide into equal groups.

(4) Separate the ones into 9 equal groups:
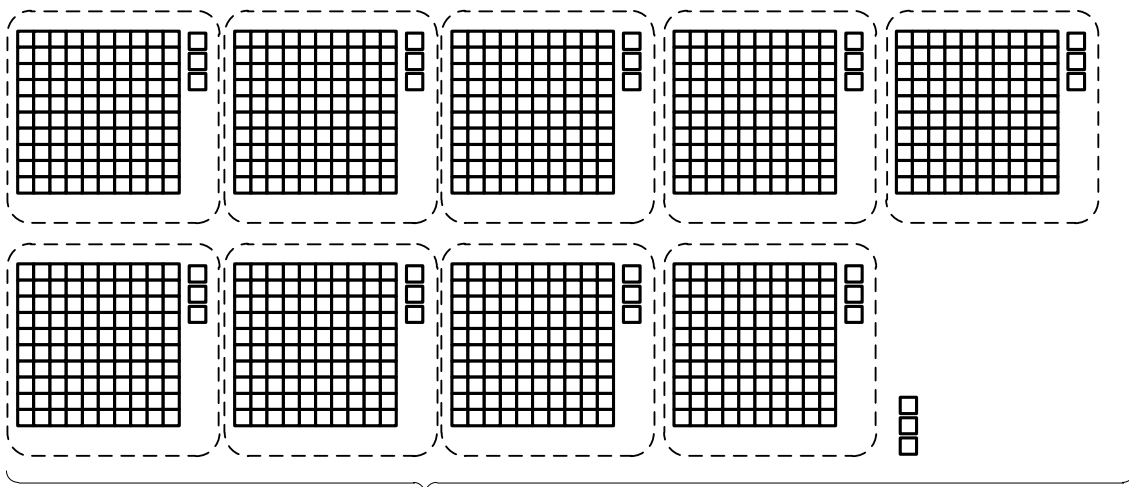
103 R3

$$\begin{array}{r} 100 + 3 \\ 9\overline{)930} \\ -900 \\ \hline 30 \\ -27 \\ \hline 3 \end{array}$$

9 groups of 103 and 3 units leftover, equals 930.

3 ones are placed into 9 equal groups. So, 9 x 3 = 27 ones with 3 ones leftover.

Zeroes in the Quotient Practice **KEY**

Solve and show your work.

(1) The math club spent $218 on two large hotel rooms at a math tournament. How much did each room cost?

218 dollars ÷ 2 rooms = $109 per hotel room

(2) There are 412 students at a school. There are 4 lunch periods. If there is the same number of students in each lunch period, how many students are in each period?

412 students ÷ 4 lunch periods = 103 students each lunch period

(3) There are 185 crayons in Mandy's crayon box. She wants to share them equally with 5 of her friends. How many crayons will Mandy and her friends each get? Will there be crayons not shared? Explain.

185 crayons ÷ 6 friends = 30 crayons per friend with 5 crayons leftover.

Zeroes in the Quotient Practice KEY

(4)   Tomas wants to put all of his 108 marbles equally into 9 jars. How many should he put into each jar? Will there be any marbles left?
Use the graphic organizer below to show the following for this problem: (1) the fact and solution represented by the situation, (2) a sketch of the solution model, (3) the related fact family, and (4) a justification of the fact family relationship.

Fact & Solution	Model Sketch
108 marbles ÷ 9 jars = 12 marbles per jar with no marbles leftover	

108 marbles divided equally into 9 jars

Related Fact Family	Justification
108 ÷ 12 = 9 *9 x 12 = 108* *12 x 9 = 108*	*Answers may vary.* *I used the base ten blocks to model the multiplication of 9 and 12 and found I had 108 blocks, etc.*

Zeroes in the Quotient Practice

Solve and show your work.

(1)   The math club spent $218 on two large hotel rooms at a math tournament. How much did each room cost?

(2)   There are 412 students at a school. There are 4 lunch periods. If there is the same number of students in each lunch period, how many students are in each period?
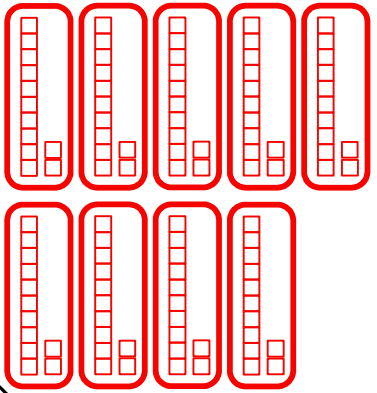
(3)   There are 185 crayons in Mandy's crayon box. She wants to share them equally with 5 of her friends. How many crayons will Mandy and her friends each get? Will there be crayons not shared? Explain.

Zeroes in the Quotient Practice

(4)   Tomas wants to put all of his 108 marbles equally into 9 jars. How many should he put into each jar? Will there be any marbles left?
Use the graphic organizer below to show the following for this problem: (1) the fact and solution represented by the situation, (2) a sketch of the solution model, (3) the related fact family, and (4) a justification of the fact family relationship.
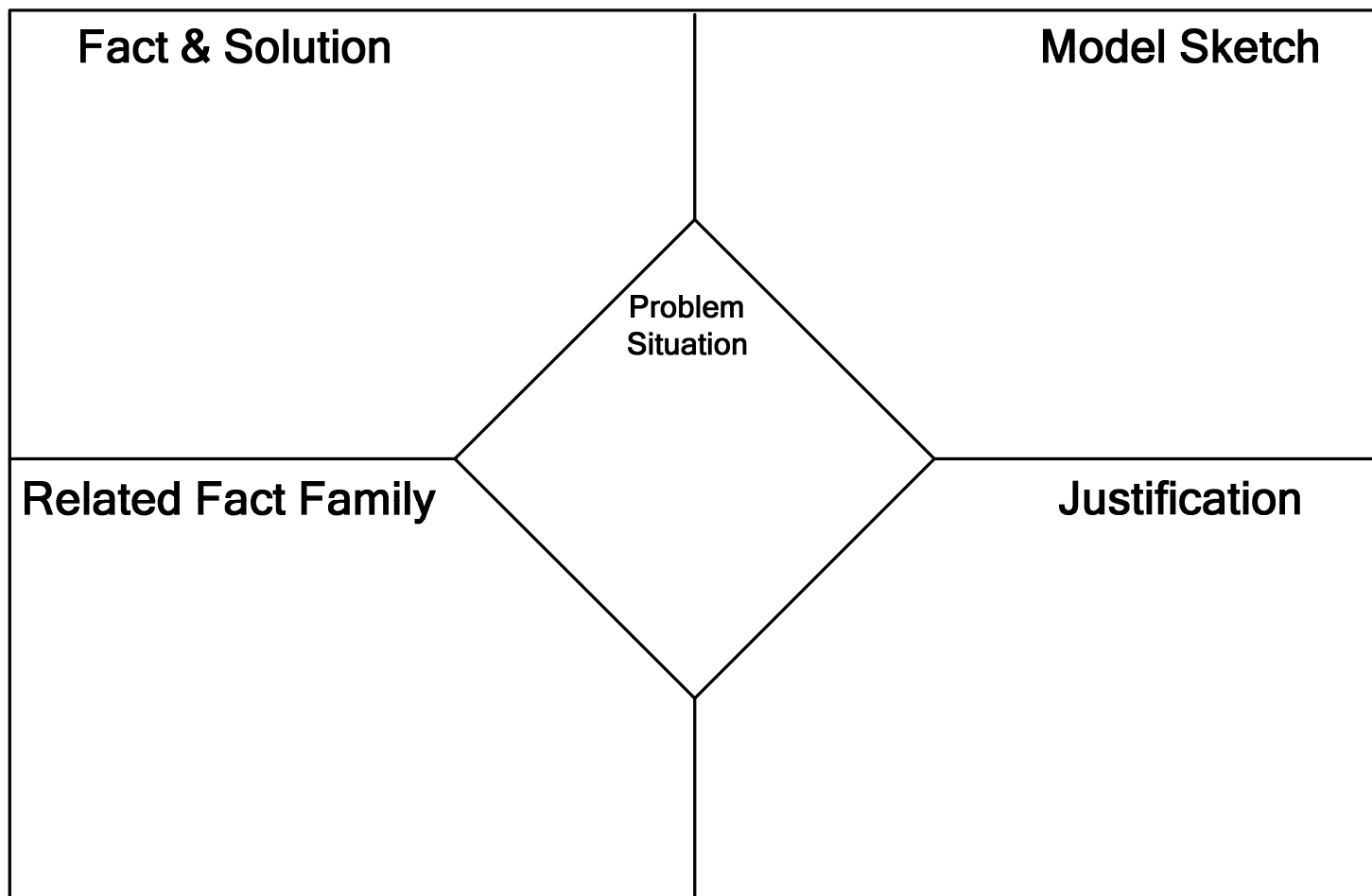
Fact & Solution	Model Sketch
Related Fact Family	**Justification**

Problem Situation

Play Money - $10 Bills

United States paper money image(s) used following official guidelines from United States Department of Treasury

Play Money - $100 Bills

Division with 0 & 1 – Notes

Place students in groups of 3 or more. Distribute counters to each group.

- Write $0 \div 4$ on the board or overhead. Prompt students to model dividing zero counters equally into four groups.
  Ask:
    The problem is asking for how many groups? *4*
    How many counters will you use in all? *0*
    How many counters will be in each group? *0*
  Finish writing the number sentence: $0 \div 4 = 0$

- Write $4 \div 1$ on the board or overhead. Prompt students to model dividing four counters equally into one group.
  Ask:
    The problem is asking for how many groups? *1*
    How many counters will you use in all? *4*
    How many counters will be in each group? *4*
  Finish writing the number sentence: $4 \div 1 = 4$

- Write $4 \div 4$ on the board or overhead. Prompt students to model dividing four counters equally into four groups.
  Ask:
    The problem is asking for how many groups? *4*
    How many counters will you use in all? *4*
    How many counters will be in each group? *1*
  Finish writing the number sentence: $4 \div 4 = 1$

- Write $4 \div 0$ on the board or overhead. Prompt students to model dividing four counters equally into zero groups.
  Ask:
    The problem is asking for how many groups? *0*
    How many counters will you use in all? *4*
    Can we divide 4 counters into 0 groups? *It is not possible.*
  Discuss with students how this statement does not make sense. If there are zero or no groups, there is nowhere to put the counters. Subsequently, in math, you cannot divide by zero.

Practice: Write and solve a division problem for each problem situation in the table below.
Candy made 7 cupcakes.

(a) If she gives the cupcakes to 7 friends, and they share the cupcakes equally, how many cupcakes will each friend get?	(b) If she gives all the cupcakes to one friend, how many cupcakes will the friend get?

Patterns in Division **KEY**

Complete each table and describe the pattern found for the divisor and the quotient.

Dividend	Divisor	Quotient
26	2	**13**
64	4	**16**
114	**6**	19
176	**8**	**22**

Divisor Pattern: **The divisor increases by 2.**

Quotient Pattern: **The quotient increases by 3.**

Describe how the divisor and quotient patterns can be used to find the dividend: **Multiply the divisor by the quotient to get the dividend; or, multiply the quotient by the divisor to get the dividend.**

Dividend	Divisor	Quotient
333	9	**37**
224	7	**32**
135	**5**	27
66	**3**	**22**

Divisor Pattern: **The divisor decreases by 2.**

Quotient Pattern: **The quotient decreases by 5.**

Describe how the divisor and quotient patterns can be used to find the dividend: **Multiply the divisor by the quotient to get the dividend; or, multiply the quotient by the divisor to get the dividend.**

Patterns in Division

Complete each table and describe the pattern found for the divisor and the quotient.

Dividend	Divisor	Quotient
26	2	
64	4	
114		19

Divisor Pattern: _____

Quotient Pattern: _____

Describe how the divisor and quotient patterns can be used to find the dividend: _____

_____

Dividend	Divisor	Quotient
333	9	
224	7	
135		27

Divisor Pattern: _____

Quotient Pattern: _____

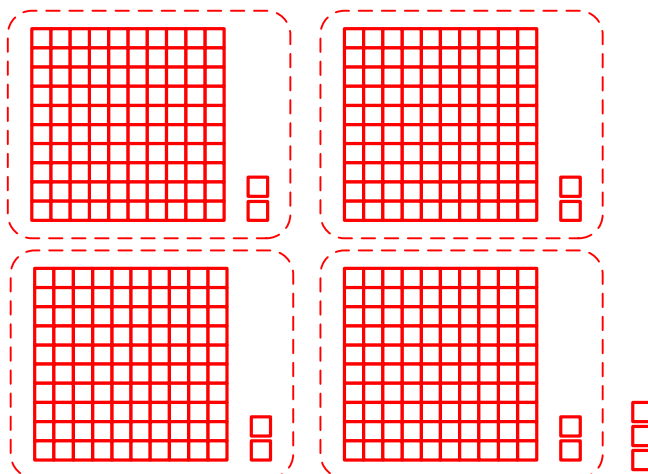**Describe how the divisor and quotient patterns can be used to find the dividend:** _____

_____

Division Assessment **KEY**

Use the problem **411 ÷ 4** to complete the following:

(1)   Create a story problem using these numbers. Identify the dividend and divisor, and then explain what they mean in your problem.

<div align="center">

Answers may vary.

</div>

(2)   Draw a model of your problem.

(3)   Record the solution to your problem.

102 (items will vary) with 3 (items will vary) leftover

4 items will vary) *411 (items will vary)*

Division Assessment

Use the problem **411 ÷ 4** to complete the following:

(1) Create a story problem using these numbers. Identify the dividend and divisor, and then explain what they mean in your problem.

(2) Draw a model of your problem.

(3) Record the solution to your problem.