3rd Grade Mathematics

Unit 2 Curriculum Map:

ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

Table of Contents

I.	Unit Overview	p. 2 - 6
II.	Math in Focus Structure	p. 7 - 9
III.	Pacing Guide/Calendar	p. 10 - 14
IV.	Math Background	p. 15
V.	Transition Guide References	p. 16-17
VI.	PARCC Assessment Evidence/Clarification Statements	p. 18-20
VII.	Mathematical Practices	p. 21
VIII.	Visual Vocabulary	p. 22-29
IX.	Potential Student Misconceptions	p. 30
X.	Multiple Representations	p. 31
XI.	Assessment Framework	p. 32
XII.	Authentic Assessments & Scoring Rubrics	p. 33-45
XIII.	Word Problem Bank	p. 46-48
XIV.	Additional Resources	p. 49-53

Unit Overview

Unit 2: Chapters 6 ,7.1, 8.1, 12, and 13
In this Unit Students will
• Solve multiplication and division word problems within 100. • Write an equation to represent a multiplication or division word problem with a symbol for the unknown. • Draw a visual representation (array, drawing, area model, etc.) for a given multiplication or division word problem. • Choose the appropriate operation based on context clues in text. • Fluently multiply and divide within 100 (know from memory all product of two one-digit numbers). • Describe the relationship between factors and products in terms of multiplication and division. • Estimate the amount of liquid/solid, using appropriate unit of measurement, based on real life applications. • Measure the amount of liquid/solid, using appropriate unit of measurement, based on real life applications. • Solve one step mass or volume word problems using the appropriate operation. • Deconstruct word problem to determine the appropriate operation to solve.
Essential Questions (Bold Writing= Largely Suggested)
➢ What stories or situations can be expressed as 5x 7? ➢ In what context can a number of groups or a number of shares can be expressed as 56÷8? ➢ What kinds of problems in your word might be modeled and solved with multiplication/division? ➢ How might multiplication help you solve a division problem? ➢ How can estimation be useful when solving multiplication and division problems? ➢ What strategies can you utilized to solve an unknown fact? ➢ How can you use know facts to help you find unknown facts? If you don't know 6x9, how can you use 6x10 to help? ➢ What properties help you solve an unknown fact or unknown products? ➢ How can you explain the patterns observed in multiplication and division combinations/facts? ➢ Why does "what" we measure influence "how" we measure? ➢ What units and tools are used to measure? ➢ How are multiplication and addition alike or related? ➢ How are multiplication and addition different? ➢ What are strategies for learning multiplication facts? ➢ How can we practice multiplication facts in a meaningful way that will help us remember them? ➢ How can we connect multiplication facts with their array models? ➢ How is the commutative property of multiplication evident in an array model? ➢ What patterns of multiplication can we discover by studying a times table chart?

- How can we determine numbers that are missing on a times table chart by knowing multiplication patterns?
- What role can arithmetic properties play in helping us understand number patterns?
- How can we model multiplication?
- How can we write a mathematical sentence to represent a multiplication model we have made?
- Is there more than one way of multiplying to get the same product?
- What patterns can be found when multiplying numbers?
- What pattern is there when we multiply by ten or a multiple of ten? By one? By zero?
- How can multiplication help us repeatedly add larger numbers?
- How does the order of the digits in a multiplication problem affect the product?

Enduring Understandings

- Multiplication can be thought of as repeated addition.
- Multiplication facts can be deduced from patterns.
- The **associative property of multiplication** can be used to simplify computation. The **associative property of multiplication** is – when I multiply 3 numbers, the way the numbers are grouped does not change the product.
- The **distributive property of multiplication** allows us to find partial products and then find their sum. The **distributive property** is – when I multiply the sum of 2 numbers by a 3rd number, it is the same as multiplying each addend by the 3rd number and adding the product.
- Patterns are evident when multiplying a number by ten or a multiple of ten.
- Multiplication and division are inverses; they undo each other.
- Multiplication and division can be modeled with arrays.
- Multiplication is commutative, but division is not. The **commutative property of multiplication** is - the order of the factors does not change the product.
- There are **two common situations where division** may be used.
  - **Partition** (or fair-sharing) - given the total amount and the number of equal groups, determine how many/much in each group **PARTITVE**
  - **Measurement** (or repeated subtraction) - given the total amount and the amount in a group, determine how many groups of the same size can be created. **QUOTATIVE**
- As the divisor increases, the quotient decreases; as the divisor decreases, the quotient increases.
  - There is a relationship between the divisor, the dividend, the quotient, and any remainder.

Common Core State Standards

3.OA.1	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*

Students recognize multiplication as a means to determine the total number of objects when there are a specific number of groups with the same number of objects in each group. Multiplication requires students to think in terms of groups of things rather than individual things. Students learn that the multiplication symbol 'x' means "groups of" and problems such as 5 x 7 refer to 5 groups of 7.

To further develop this understanding, students interpret a problem situation requiring multiplication using pictures, objects, words, numbers, and equations. Then, given a multiplication expression (e.g., 5 x 6) students interpret the expression using a multiplication context. They should begin to use the terms, *factor* and *product,* as they describe multiplication.

For example: Jim purchased 5 packages of muffins. Each package contained 3 muffins. How many muffins did Jim purchase? 5 groups of 3, 5 x 3 = 15. Describe another situation where there would be 5 groups of 3 or 5 x 3.

Sonya earns $7 a week pulling weeds. After 5 weeks of work, how much has Sonya worked? Write an equation and find the answer. Describe another situation that would match 7 x 5.

3.OA.2	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 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 partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*

Students recognize the operation of division in two different types of situations. One situation requires determining how many groups and the other situation requires sharing (determining how many in each group). Students should be exposed to appropriate terminology (quotient, dividend, divisor, and factor).

To develop this understanding, students interpret a problem situation requiring division using pictures, objects, words, numbers, and equations. Given a division expression (e.g., 24 ÷ 6) students interpret the expression in contexts that require both interpretations of division.

For example: Partition models provide students with a total number and the number of groups. These models focus on the question, "How many objects are in each groups so that the groups are equal?" A context for partition models would be: There are 12 cookies on the counter. If you are sharing the cookies equally among three bags, how many cookies will go in each bag?

Measurement (repeated subtraction) models provide students with a total number and the number of objects in each group. These models focus on the question, "How many equal groups can you make?' A context for measurement models would be: There are 12 cookies on the counter. If you put 3 cookies in each bag, how many bags will you fill?

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.

This standard references various problem solving context and strategies that students are expected to use while solving word problems involving multiplication and division. Students should use variety of representations for creating and solving one step word problems, such as: If you divide 4 packs of 9 brownies among 6 people, how many cookies does each person receive? (4 x 9 = 36, 36 ÷ 6 = 9).

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 × ? = 48, 5 = □÷ 3, 6 × 6 = ?.*

This standard is strongly connected to 3.OA.3 where students solve problems and determine unknowns in equations. Students should also experience creating story problems for given equations. When crafting story problems, they should carefully consider the question(s) to be asked and answered to write an appropriate equation. Students may approach the same story problem differently and write either a multiplication equation or division equation.

Students apply their understanding of the meaning of the equal sign as ”the same as” to interpret an equation with an unknown. When given 4 x ? = 40, they might think:

- 4 groups of some number is the same as 40

- 4 times some number is the same as 40
- I know that 4 groups of 10 is 40 so the unknown number is 10
- The missing factor is 10 because 4 times 10 equals 40.

Equations in the form of a x b = c and c = a x b should be used interchangeably, with the unknown in different positions.

Examples:

- Solve the equations below:
  24 = ? x 6
  72 ÷ Δ = 9
- Rachel has 3 bags. There are 4 marbles in each bag. How many marbles does Rachel have altogether? 3 x 4 = *m*

Students may use interactive whiteboards to create digital models to explain and justify their thinking.

3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

By studying patterns and relationships in multiplication facts and relating multiplication and division, students build a foundation for fluency with multiplication and division facts. Students demonstrate fluency with multiplication facts through 10 and the related division facts. Multiplying and dividing fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently. Strategies students may use to attain fluency include:

- Multiplication by zeros and ones
- Doubles (2s facts), Doubling twice (4s), Doubling three times (8s)
- Tens facts (relating to place value, 5 x 10 is 5 tens or 50)
- Five facts (half of tens)
- Skip counting (counting groups of __ and knowing how many groups have been counted)
- Square numbers (ex: 3 x 3)
- Nines (10 groups less one group, e.g., 9 x 3 is 10 groups of 3 minus one group of 3)
- Decomposing into known facts (6 x 7 is 6 x 6 plus one more group of 6)
- Turn-around facts (Commutative Property)
- Fact families (Ex: 6 x 4 = 24; 24 ÷ 6 = 4; 24 ÷ 4 = 6; 4 x 6 = 24)
- Missing factors

General Note: Students should have exposure to multiplication and division problems presented in both vertical and horizontal forms.

3.OA.8	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Students should be exposed to multiple problem-solving strategies (using any combination of words, numbers, diagrams, physical objects or symbols) and be able to choose which ones to use. When students solve word problems, they use various estimation skills which include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying solutions or determining the reasonableness of solutions.

Student 1	Student 2	Student 3
I first thought about 267 and 34. I noticed that their sum is about 300. Then I knew that 194 is close to 200. When I put 300 and 200 together, I get 500.	I first thought about 194. It is really close to 200. I also have 2 hundreds in 267. That gives me a total of 4 hundreds. Then I have 67 in 267 and the 34. When I put 67 and 34 together that is really close to 100. When I add that hundred to the 4 hundred that I already had, I end up with 500.	I rounded 267 to 300. I rounded 194 to 200. I rounded 34 to 30. When I added 300, 200, and 30. I know my answer be about 500.

3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms(kg), and liters. Add and subtract to solve one-step word problems involving masses or volumes that are given in the same units, e.g. by using drawings (such as a beaker with measurement scale)to represent problem.
This standard references various problem solving context and strategies that students are expected to use while solving word problems involving multiplication and division. Students should use variety of representations for creating and solving one step word problems, such as: If you divide 4 packs of 9 brownies among 6 people, how many cookies does each person receive? (4 x 9 = 36, 36 ÷ 6 = 9)	
3. MD.6	Measure areas by counting unit squares.
Students should be counting the square units to find the area could be done in metric, customary, or non-standard square units. Using different sized graph paper, students can explore the areas measured in square centimeters and square inches.	

M : Major Content S: Supporting Content A : Additional Content

MIF Lesson Structure

	LESSON STRUCTURE	RESOURCES	COMMENTS
PRE TEST	**Chapter Opener** Assessing Prior Knowledge *The Pre Test serves as a diagnostic test of readiness of the upcoming chapter*	**Teacher Materials** Quick Check Pretest (Assessm't Bk) Recall Prior Knowledge **Student Materials** Student Book (Quick Check); Copy of the Pre Test; Recall prior Knowledge	Recall Prior Knowledge (RPK) can take place just before the pre-tests are given and can take 1-2 days to front load prerequisite understanding Quick Check can be done in concert with the RPK and used to repair student misunderstandings and vocabulary prior to the pre-test ; Students write Quick Check answers on a separate sheet of paper Quick Check and the Pre Test can be done in the same block *(See Anecdotal Checklist; Transition Guide)* Recall Prior Knowledge – Quick Check – Pre Test
DIRECT ENGAGEMENT	**Direct Involvement/Engagement** Teach/Learn *Students are directly involved in making sense, themselves, of the concepts – by interacting the tools, manipulatives, each other, and the questions*	**Teacher Edition** 5-minute warm up Teach; Anchor Task **Technology** Digi **Other** Fluency Practice	• The Warm Up activates prior knowledge for each new lesson • Student Books are CLOSED; Big Book is used in Gr. K • Teacher led; Whole group • Students use concrete manipulatives to explore concepts • A few select parts of the task are explicitly shown, but the majority is addressed through the hands-on, constructivist approach and questioning • Teacher facilitates; Students find the solution
GUIDED LEARNING	**Guided Learning and Practice** Guided Learning	**Teacher Edition** Learn **Technology** Digi **Student Book** Guided Learning Pages Hands-on Activity	Students-already in pairs /small, homogenous ability groups; Teacher circulates between groups; Teacher, anecdotally, captures student thinking **Small Group w/Teacher circulating among groups** Revisit Concrete and Model Drawing; Reteach Teacher spends majority of time with struggling learners; some time with on level, and less time with advanced groups Games and Activities can be done at this time

INDEPENDENT PRACTICE	**Independent Practice** *A formal formative assessment*	**Teacher Edition** Let's Practice **Student Book** Let's Practice **Differentiation Options** All: Workbook Extra Support: Reteach On Level: Extra Practice Advanced: Enrichment	**Let's Practice** determines readiness for Workbook and small group work and is used as formative assessment; Students not ready for the Workbook will use Reteach. The Workbook is continued as Independent Practice. Manipulatives **CAN** be used as a communications tool as needed. Completely Independent On level/advance learners should finish all workbook pages.
ADDITIONAL PRACTICE	**Extending the Lesson**	Math Journal Problem of the Lesson Interactivities Games	
	Lesson Wrap Up	Problem of the Lesson Homework (Workbook , Reteach, or Extra Practice)	Workbook or Extra Practice Homework is only assigned when students fully understand the concepts (as additional practice) Reteach Homework (issued to struggling learners) should be checked the next day
POST TEST	**End of Chapter Wrap Up and Post Test**	**Teacher Edition** Chapter Review/Test Put on Your Thinking Cap **Student Workbook** Put on Your Thinking Cap **Assessment Book** Test Prep	Use Chapter Review/Test as "review" for the End of Chapter Test Prep. Put on your Thinking Cap prepares students for novel questions on the Test Prep; Test Prep is graded/scored. The Chapter Review/Test can be completed • Individually (e.g. for homework) then reviewed in class • As a 'mock test' done in class and doesn't count • As a formal, in class review where teacher walks students through the questions Test Prep is completely independent; scored/graded Put on Your Thinking Cap (green border) serve as a capstone problem and are done just before the Test Prep and should be treated as Direct Engagement. By February, students should be doing the Put on Your Thinking Cap problems on their own.

TRANSITION LESSON STRUCTURE **(No more than 2 days)**

- **Driven by Pre-test results, Transition Guide**
- **Looks different from the typical daily lesson**

Transition Lesson – Day 1 **Objective:**	
CPA Strategy/Materials	**Ability Groupings/Pairs (by Name)**
Task(s)/Text Resources	**Activity/Description**

MIF Pacing Guide

Activity	Common Core Standards	Time	Lesson Notes
Pre-Test 6		1/2 block	*Important* Teachers please be sure to use the transitional guide to help locate specific materials needed to reteach skills that students struggled with on the Pre-Test
Day 1 Review - Equal groups of	3.OA.1, 3.OA.7	1 block	**EQ:** *What kinds of problems in your own words might be modeled and solved with multiplication?* Circles and Stars and please read children's book **"Each Orange Has 8 Slices"** by **Paul Giganti**
Day 2 Review - Repeated Addition	3.0A. 1, 3.OA.3	1 block	**EQ:** How are multiplication and addition alike and different? **Amanda Bean's Amazing Dream** by **Liz Woodruff**
Day 3 Review - Number line	3.OA.1, 3.0A.3	1 block	
Day 4 Review - Skip Counting	3.OA.7	1 block	
Day 5 Review - Arrays/Area Model	3.OA.3, 3.OA.7, 3.MD.6, and 3.MD.7	1 block	Array Picture Cards along with activity can be found on **K-5 Math Teaching Resources.com** under 3rd grade
Day 6 - Patterns of Multiplication	3.OA.9	1 block	**One Hundred Hungry Ants** by **Elinor J Pinczes**
Day 7 - Contextualizing Multiplication Expressions	3.OA. 2, 3.OA. 3	1 block	
Authentic Assessment #5	3.NBT.2 and 3.OA.3	1/2 block	"Classroom Supplies"
6.1 Multiplication Properties with Problem Solving	3.OA 4 -7	2 blocks	Please make sure majority of number expressions are unpacked through a number story/real-world word problems. Suggested book, read aloud **Bunches and Bunches of Bunnies** by **Louise Matthews**
6.2 Multiply by 6 with Problem Solving	3.OA 4 -7, 3.OA.9	1 block	Please read aloud "**The Best of Times**" by **Greg Tang**. It's an excellent resource for multiplication mathematical strategies. This book can be found in your public library or school library, if not, you can always purchase used copy online.
6.3 Multiply by 7 with Problem Solving	3.MD. 6 and 3.OA.9	1 block	Open array model and distributive property is very instrumental in helping children solve difficult basic facts.
6.4 Multiply by 8 with Problem Solving	3.MD. 6 and 3.OA.9	1 block	Any number you multiply by eight, simply double once, double again then double one more time. Use what you know about multiples of 2s and 4s to solve multiples of 8s .
6.5 Multiply by 9 with Problem Solving	3.MD. 6 and 3.OA.9	1 block	
Review Division - Equal Shares	3.OA.2-3 and 3.OA.6	1 block	**"The Doorbell Rang"** by **Pat Hutchins** (story can also be found on YouTube)
Review Division - Equal Groups (repeated subtraction)	3.OA 2-3, 3.OA. 4	1 block	strategies fairly grouping and repeated subtraction

Authentic Assessment #6	3.OA.2, 3.OA.4	1/2 block	"Finding the Unknown in a Division Equation"
6.6 Division: Finding the Number of Items in Each Group with Problem Solving	3.OA,2-3 and 3.OA.6	1 bloc	Have students to frequently draw out or act out the problems using manipulatives
6. 7 Division: Making Equal Groups with Problem Solving	3.OA,2 and 3.OA.6-7	1 block	Have students to frequently draw out or act out the problems using manipulatives
Review		1 block	
Chapter 6 Test/Review + TP		1 block	
Problem Solving (2 step word problems)	3.OA.8	2 block	
Authentic Assessment #7	3.OA.5 and 3.OA.6	1/2 block	"Amusement Park"
7.1 Mental Multiplication with Problem Solving	3.NBT.3, 3.OA3-5, and 3.OA.7 and 3.OA.9	1 block	
8.1 Mental Division with Problem Solving	3.OA4-7	1 block	**Diagrams:** Number bonds, open array models, multiplication and division properties , bar models and open number lines
Chapter 7/8 Modified Chapter Test/Review +TP	3.OA.7 3.OA.9	1/2 block	
Authentic Assessment #8	3OA.7	1/2 block	"Cookie Dough"
Mini Assessment #3	3.OA.1-4	1/2 block	
Mini Assessment #4	3.OA.9	1/2 block	
Chapter 12 Pretest	3.MD.2	1/2 block	
12.1 Real World Problems Measurement	3.MD.2	1 block	
12.2 Real Word Problems Two-steps	3.MD.2	1 block	
Review	3.MD.2	1 block	
Chapter 12 Test/Review + TP	3.MD.2	1 block	
Mini Assessment #5	3.MD.2	1/2 block	
Authentic Assessment #9	3.MD.2	1/2 block	"Weighing Fruit"
Chapter 13 Pretest	3. MD.3	1/2 block	
13.1 Making Bar Graphs with Scales	3.MD.3	1 block	
13.2 Reading and Interpreting Bar Graphs	3.MD.3	1 block	
Review	3.MD.3	1 block	
Chapter 13a Test/Review	3.MD.3	1/2 block	Line Plots will appear in Unit 3
Authentic Assessment #10	3.MD.3	1/2 block	"Toni's School Supplies"

Pacing Calendar

NOVEMBER

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	*4*	5	6	7
8	9	10	11	*12*	13	14
15	16 Pre-test Chapter 6	17 Review Activities / strategies prior to start of Chapter 6	18	19	20	21
22	23	24	25	26 No School	27 No School	28
29	30					

December

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	***2 Authentic Assessment # 5***	**3 Start 6.1**	**4**	**5**
6	**7**	**8**	**9**	***10***	**11**	**12**
13	**14**	**15 *Authentic Assessment* # 6**	**16**	**17**	**18**	**19**
20	**21**	**22 Chapter 6 Test/Review**	**23 Problem Solving**	**24 No School**	**25 No School**	**26**
27	**28 No School**	**29 No School**	**30 No School**	**31 No School**		

January

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 No School	2
3	4	5	6 *Authentic Assessment* # 7	*7 Start 7.1*	8 Start 8.1	9
10	11	12 *Authentic Assessment* # 8	13 Chapter 12 Pre-Test	14	15	16
17	18 No School	19	20 Chapter 12 Test/Review	21 *Authentic Assessment* # 9	22 Chapter 13 Pre-test	23
24	25	26	27	28	29 *Authentic Assessment* # 10	30
31						

Math Background

During their elementary mathematics education, students learned basic meanings of equal groups for multiplication and division. They were taught that multiplication is the addition of equal groups, division as sharing equally. They were also taught to group items equally, as well as how to relate and apply the concepts to word problems.

Students learned multiplication as repeated addition, and division as sharing or grouping. Also, they learned the multiplication facts for 2, 3, 4, 5, and 10. They also learned that multiplication and division are related as inverse operations. So, division can be used to find a missing factor. The missing number in the number sentence 2 x __ = 8 is the answer to 8 divided by 2.

Students learned to use bar models to solve two-step problems involving addition and subtraction. This is extended in this unit to include multiplication and division.

Students learned to read, interpret, and create bar graphs where information is first collated in a tally chart.

Transition Guide References:

Chapter : 6 Multiplication Tables of 6, 7, 8 & 9				
Transition Topic: Multiplication of Whole Numbers				
Chapter 6 **Pre Test Items**	**Objective**	**Additional Reteach Support:** **Grade 2 Reteach**	**Additional Extra Practice Support: Grade 2 Extra Practice**	**Teacher Edition Support: Grade 2 Teacher Edition**
Chapter 6 1,2,4,5,	Use equal groups and repeated addition to multiply.	2App. 101-106	Lesson 5.1	2A Chapter 5 Lesson 1
Chapter 6 3,13	Divide to share equally.	2App. 107-109	Lesson 5.2	2A Chapter 5 Lesson 2
Chapter 6 13	Solve division word problems.	2App. 110-112	Lesson 5.3	2A Chapter 5 Lesson 3
Chapter 6 4	Skip-count by 3s to multiply by 3.	2Bpp. 91-92	Lesson 15.1	2B Chapter 15 Lesson 1

Chapter : 12 Real World Problems				
Transition Topic: Problem Solving and Bar Models				
Chapter 12 **Pre Test Items**	**Objective**	**Additional Reteach Support** **Grade 2 Reteach**	**Additional Extra Practice Support** **Grade 2 Extra Practice**	**Teacher Edition Support**
Chapter 12 Items 4; 10	Model addition and subtraction as comparing sets.	2A pp. 93–97	Lesson 4.3	2A Chapter 4 Lesson 3
Chapter 12 Items 4; 10	Use bar models to solve problems about mass.	2A pp. 173–176	Lesson 8.5	2A Chapter 8 Lesson 5

Chapter 12 Items 4; 10	Use bar models, addition, and subtraction to solve real-world problems about volume.	2A pp. 185–188	Lesson 9.3	2A Chapter 9 Lesson 3
Chapter 12 Items 4; 11–12	Use bar models to solve real-world problems on measurement and money.	2B pp. 119–126	Lesson 16.3	2A Chapter 4 Lesson 3 (money); Chapter 7 Lesson 5 (measurement)

PARCC Assessment Evidence/Clarification Statements

CCSS	Evidence Statement	Clarification	Math Practices
3.OA.1	Interpret products of whole numbers, e.g. interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 x 7.*	i) Task involve interpreting products in terms of equal groups, arrays, area, and/or measurement quantities. ii) Tasks do not require students to interpret products in terms of repeated addition, skip-counting, or jumps on the number line. iii) The italicized example refers to describing a context. But describing a context is not the only way to meet the standard. For example, another way to meet the standard would be to identify contexts in which a total can be expressed as a specified product.	4,2
3.OA.2	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 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 partitioned into equal shares of 8 objects. *For example, describe a context in which a number shares or a number of groups can be expressed as 56÷8.*	i) Tasks involve interpreting quotients in terms of equal groups, arrays, area, and/or measurement quantities. ii) Tasks do not require students to interpret quotients in terms of repeated addition, skip-counting, or jumps on the number line. iii) The italicized example refers to describing a context. But describing a context is not the only way to meet the standard. For example, another way to meet the standard would be to identify contexts in which a total can be expressed as a specified product. iv) 50% of tasks require interpreting quotients as a number of objects in each share. 50% of tasks require interpreting quotients as a number of equal shares.	4,2
3.OA.3-1	Use multiplication within 100 to solve word problems in situations involving equal groups, arrays, or area, e.g by using drawings and equations with a symbol for the unknown number to represent the problems.	i) All problems come from the harder three quadrants of the times table (ax b, where a > 5 and/or b >5). ii) 50% of task involve multiplying to find the total number (equal groups, arrays); 50% involve multiplying to find the area. iii) For more information see CCSS Table 2 page 89 and the Progression document for Operations and Algebraic Thinking.	1,4
3.OA.3-2	Use multiplication within 100 to solve word problems in situations involving equal groups, arrays, or area, e.g by using drawings and	i) All problems come from the harder three quadrants of the times table (a x b, where a > 5 and/or b > 5). ii). Tasks involve multiplying to find a	1,4

	equations with a symbol for the unknown number to represent the problems.	total measure (other than area). iii). For more information see CCSS Table 2 page 89 and the Progression document for Operations and Algebraic Thinking.	
3.OA.3-3	Use division within 100 (quotients related to products having both factors less than or equal to 10) to solve word problems in situations involving equal groups, arrays, or area, e.g. by using drawings and equations with a symbol for the unknown number to represent the problem.	i). All quotients are related to products from the harder three quadrants of the times table (a x b where a > 5 and/or b > 5). ii). A third of tasks involve dividing to find the number in each equal group or in each equal row/column of an array; a third of tasks involve dividing to find the number of equal groups or the number of equal rows/columns of an array; a third of task involve dividing an area by a side length to find an unknown side length. iii). For more information see CCSS Table 2 page 89 and the Progression document for Operations and Algebraic Thinking.	1,4
3.OA.3-4	Use division within 100 (quotients related to products having both factors less than or equal to 10) to solve problems in situations involving measurement quantities other than area, e.g. by using drawings and equations with a symbol for the unknown number to represent the problem.	i). All quotients are related to products from the harder three quadrants of the times table (a x b where a > 5 and/or b > 5). ii). 50% of tasks involve finding the number of equal pieces; 50% involve finding the measure of each piece. iii).For more information see CCSS Table 2 page 89 and the Progression document for Operations and Algebraic Thinking.	1, 4
3.OA.4	Determine the unknown whole number in a multiplication or division equation relating the whole numbers. For example, determine the unknown number that makes the equation true in each equation. 8 x ? = 48, 5 = ? + 3, 6 x 6 =?	i) Tasks do not have a context. ii) Only the answer is required (methods, representations, etc...are not assessed here). iii) All products and related quotients are from the harder three quadrants of the times table (a x b where a > 5 and/or b >5).	-
3.OA.6	Understand division as an unknown factor problem. For example find 32÷8 by finding the number that makes 32 when multiplied by 8.	i) All products and related quotients are related to products from the harder three quadrants of the times table (a x b where a > 5 and/or b > 5).	
3.OA. 7	Fluently multiply and divide within 25, using strategies such as the relationship between multiplication and division (e.g. knowing that 4x4 = 16, one knows that 16÷4=4) or properties of operations. By the end of	i). Tasks do not have a context. ii). Only the answer is required (strategies, representations, etc. are not assessed here). iii). Tasks require fluent (fast and accurate) finding of products and	

	grade 3, know from memory all products of two one digit numbers.	related quotients. For example, each one point task might require four or more computations, two or more multiplication, and two or more division. However, tasks are not explicitly timed.	
3.OA.8-1	Solve two-step word problems using the four operations (for Unit 1 just two addition and subtraction) Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	i) Only the answer is required (methods, representations, etc. are not assessed here). iii) Addition, subtraction, multiplication, and division situations in these problems man involve any of the basic situations types with unknowns in various positions. iii) If scaffolded, one of the 2 parts must require 2-steps. The other part may consist of 1-step. iv) Conversions should be part of the 2-steps and should not be a step on its own. v) If the item is 2 points, the item should be a 2 point, unscaffolded item but the rubric should allow for 2-1-0 points.	1, 4

Connections to the Mathematical Practices

1	**Make sense of problems and persevere in solving them**
	In **third** grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Third graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try approaches. They often will use another method to check their answers.
2	**Reason abstractly and quantitatively**
	In **third** grade, students should recognize that number represents a specific quantity. They connect quantity to written symbols and create logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities
3	**Construct viable arguments and critique the reasoning of others**
	In **third** grade, mathematically proficient students may construct viable arguments using concrete referents, such as objects, pictures, and drawings. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like, "How did you get that?" and "Why is it true?" They explain their thinking to others and respond to others' thinking.
4	**Model with mathematics**
	Mathematically proficient students experiment with representing problem situations in multiple ways including numbers, words (mathematical language) drawing pictures, using objects, acting out, making chart, list, or graph, creating equations etc…Students need opportunities to connect different representations and explain the connections. They should be able to use all of the representations as needed. **Third** graders should evaluate their results in the context of the situation and reflect whether the results make any sense.
5	**Use appropriate tools strategically**
	Third graders should consider all the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For example, they might use graph paper to find all possible rectangles with the given perimeter. They compile all possibilities into an organized list or a table, and determine whether they all have the possible rectangles.
6	**Attend to precision**
	Mathematical proficient **third** graders develop their mathematical communication skills; they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying their units of measure and state the meaning of the symbols they choose. For instance, when figuring out the area of a rectangle the record their answer in square units.
7	**Look for and make use of structure**
	In **third** grade, students should look closely to discover a pattern of structure. For example, students properties of operations as strategies to multiply and divide. (commutative and distributive properties.
8	**Look for and express regularity in repeated reasoning**
	Mathematically proficient students in third **grade** should notice repetitive actions in computation and look for more shortcut methods. For example, students may use the distributive property as a strategy for using products they know to solve products that they don't know. For example, if students are asked to find the product of 7x8, they might decompose 7 into 5 and 2 and then multiply 5 x 8 and 2 x 8 to arrive at 40 + 16 or 56. In addition, third graders continually evaluate their work by asking themselves, "Does this make sense?"

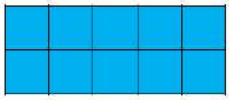
Visual Vocabulary

Visual Definition

The terms below are for teacher reference only and are not to be memorized by students. Teachers should first present these concepts to students with models and real life examples. Students should understand the concepts involved and be able to recognize and/or use them with words, models, pictures, or numbers.

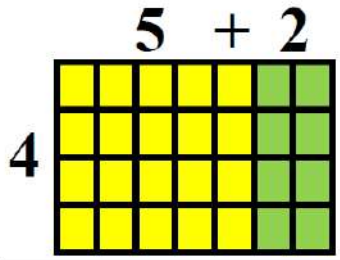
area

2 rows of 5 = 10 square units
or
2 x 5 = 10 square units



The measure, in square units, of the inside of a plane figure.

area model



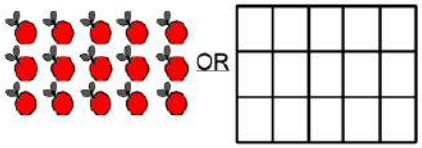
4 x 7 = (4 x 5) + (4 x 2) = 28

A model of multiplication that shows the product within a rectangle drawing.

Can break apart the model into smaller arrays to find unknown facts.

array

3 rows of 5
3 x 5



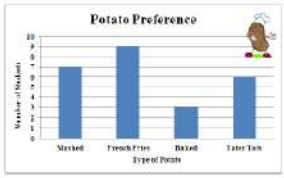
An arrangement of objects in equal rows.

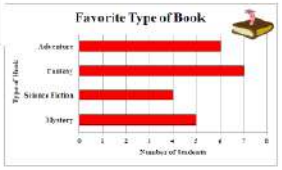
Associative Property of Multiplication

(5 x 7) x 3 = 5 x (7 x 3)
35 x 3 = 5 x 21
105 = 105

Changing the grouping of three or more factors does not change the product.

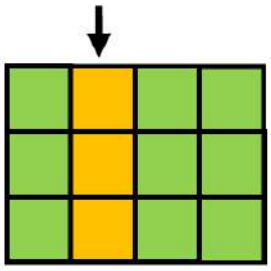
bar graph





A graph that uses height or length of rectangles to compare data.

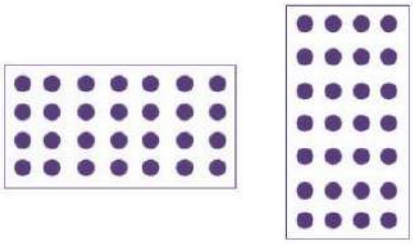
column



Columns go up and down.

A vertical arrangement of numbers or information in an array or table.

Commutative Property of Multiplication

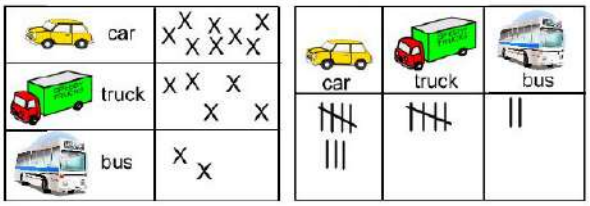


$4 \times 7 = 7 \times 4$

Changing the order of the factors does not change the product.

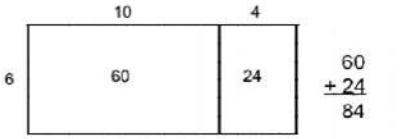
data

data *collecting*



A collection of information.

Distributive Property



6 x 14 = 6 x (10 + 4) *Break up the 14 into 10 + 4

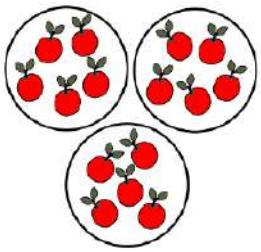
6 x (10 + 4)

(6 x 10) + (6 x 4)

60 + 24 = 84

When one of the factors of a product is a sum, multiplying each addend before adding does not change the product.

divide



$15 \div 3 = 5$

To separate into equal groups and find the number in each group or the number of groups.

dividend

$7\overline{)56}$

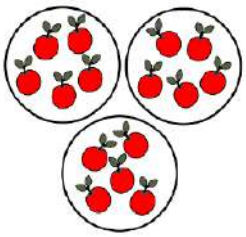
A number that is divided by another number.

divisor

$7\overline{)56}$

The number which anoth number is divi

equal groups



There are 3 equal groups of 5.

Groups that contain the same number of objects. Whenever you divide, you separate items into equal groups.

fact family

Fact Family for 3, 5, 15

$3 \times 5 = 15$	$15 \div 5 = 3$
$5 \times 3 = 15$	$15 \div 3 = 5$

A group of related facts that use the same numbers. (also known as related facts)

factor

$2 \times 6 = 12$

factors

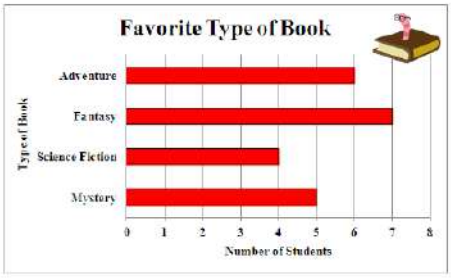
The whole numbers that are multiplied to get a product.

frequency table

Favorite Fruit	
Orange	5
Apple	7
Pear	3

A table that uses numbers to record data.

horizontal bar graph



A graph that uses length of rectangles to compare data.

inverse operations

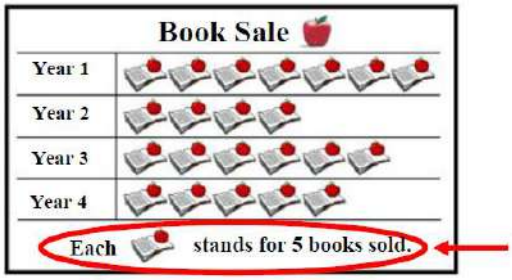
Multiplication and division are inverse operations.

$8 \times 5 = 40$

$40 \div 5 = 8$

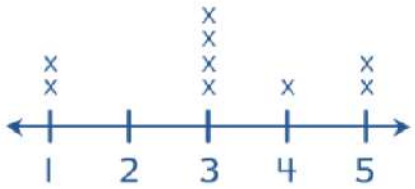
Operations that undo each other.

key



A part of a map, graph, or chart that explains what the symbols mean.

line plot



A diagram showing frequency of data on a number line.

multiple

12 is a multiple of 3 (and of 4) because 3 x 4 = 12

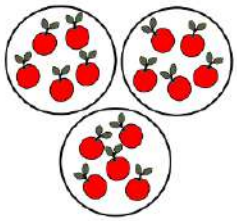
A product of a given whole number and any other whole number.

Multiplicative Identity Property of 1

1 group of 3 = 3
1 x 3 = 3

If you multiply a number by one, the product is the same as that number.

multiply



3 x 5 = 5 + 5 + 5

The operation of repeated addition of the same number.

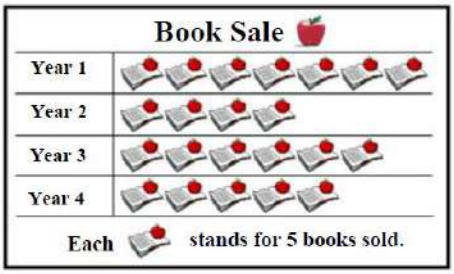
partitive division

(sharing division)

Justin has 12 balloons. He wants to share them evenly among 3 friends. How many balloons should he give each friend? 12 ÷ 3 = 4

A division problem where the number of objects in each group is unknown. *How many in each group?*

picture graph



A graph that uses pictures or symbols to show data.

product

5 x 3 = 15

The answer to a multiplication problem.

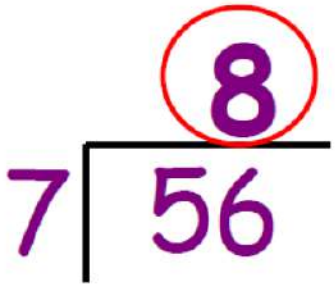
quotative division

(measurement division)

Justin has 12 balloons. If he gives 3 balloons to each friend, how many friends will get balloons? 12 ÷ 3 = 4

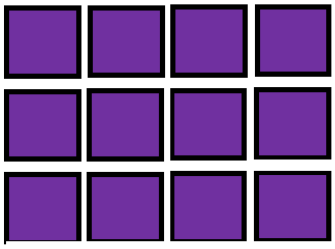
A division problem where the number of groups is unknown. *How many groups?*

quotient



The answer to a division problem.

repeated addition

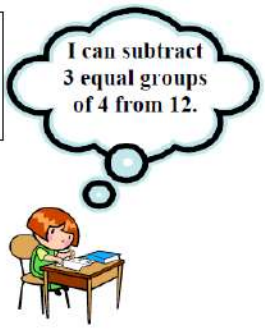


4 + 4 + 4 = 12

Adding equal groups of objects to find the total amount of objects.

repeated subtraction

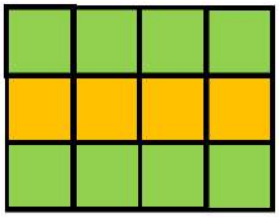
$12 - 4 = 8$
$8 - 4 = 4$
$4 - 4 = 0$



Subtracting equal groups to find the total amount of groups.

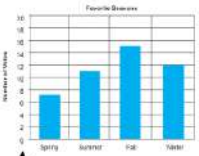
row

Rows go from left to right. →



A horizontal arrangement of numbers or information in an array or table.

scale (on a graph)



Each rectangle represents 2 votes.

Each picture represents 5 books.

The numbers that show the units used on a graph.

survey

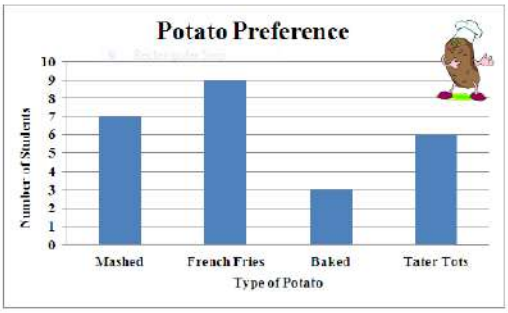
A way to gather data by asking questions.

tally table

Favorite Fruit	
Orange	𝍸
Apple	𝍸 ||
Pear	|||

A table that uses tally marks to record data.

vertical bar graph



A graph that uses height of rectangles to compare data.

Zero Property of Multiplication

8 x 0 = 0

The product of any number and zero is 0.

Potential Student Misconceptions

- Students may not understand story problems. Maintain student focus on the meaning of the actions and number relationships, and encourage them to model the problem or draw as needed. Students often depend on key words, strategy that often is not effective. For example, they might assume that the word left always means that subtraction must be used. Providing problems in which key words are used to represent different operations is essential. For example, the use of the word left in this problem does not indicate subtraction. Suzy took 28 stickers she no longer wanted and gave them to Anna. Now Suzy has 50 stickers left. How many stickers did Suzy have to begin with? Students need to analyze word problems and avoid using key words to solve them.

- Students may not interpret multiplication by considering one factor as the number of groups and the other factor as the number in each group. Have student model multiplication situations with manipulatives or pictorially. Have students write multiplication and division word problems.

- Students solve multiplication word problems by adding or dividing problems by subtracting. Students need to consider whether a word problem involves taking apart or putting together equal groups. Have students model word problems and focus on the equal groups that they see.

- Students believe that you can use the commutative property for division. For example, students think that 3 ÷ 15 =15 is the same as 15 ÷ 3 =5. Have students represent the problem using models to see the difference between these two equations. Have them investigate division word problems and understand that division problems give the whole and an unknown, either the number of groups or the number in each group.
- Students may not understand the relationship between addition/multiplication and subtraction/division. Multiplication can be understood as repeated addition of equal groups; division is repeated subtraction of equal groups. Provide students with word problems and invite students to solve them. When students solve multiplication problems with addition, note the relationship between the operations of addition and multiplication and the efficiency that multiplication offers. Do the same with division problems and subtraction.

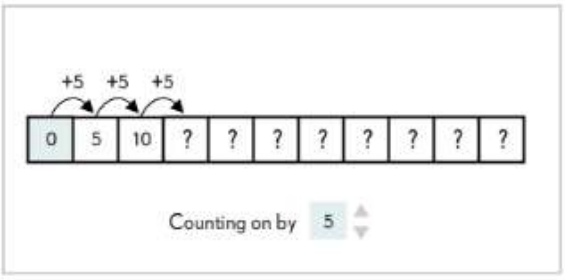
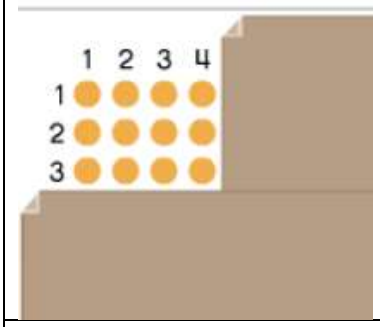
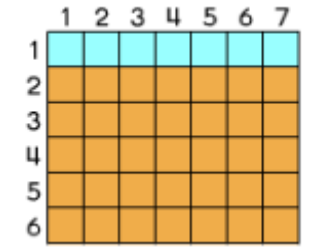
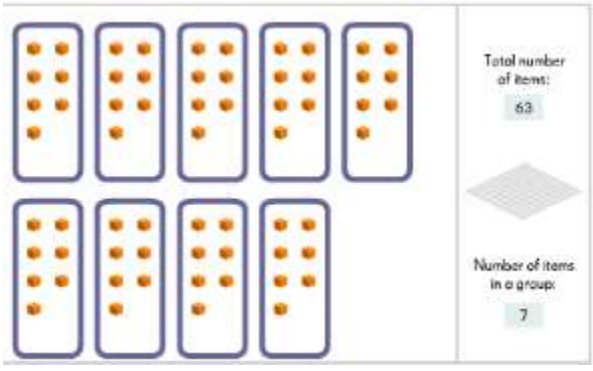
- Students may not understand the two types of division problems**. Division problems are of two different types--finding the number of groups** ("**quotative**" or "**measurement"**) and finding the number in each group ("**partitive equally sharing/fairly dealing** " or "**/quotative/equally grouping/repeatedly subtracting**"). Make sure that students solve word problems of these two different types. Have them create illustrations or diagrams of each type, and discuss how they are the same and different. Connect the diagrams to the equations.

- Students use the addition, subtraction, multiplication, or division algorithms incorrectly. Remember that the traditional algorithms are only one strategy. Partial sums, partial products, and partial quotients are examples of alternative strategies that highlight place value and properties of operations, Have students solve problems using multiple models, including numbers, pictures, and words.

- Students think a symbol (? or []) is always the place for the answer. This is especially true when the problem is written as 15 ÷ 3 =? or 15 = o x 3. Students also think that 3 ÷ 15 = 5 and 15 ÷ 3 = 5 are the same equations. The use of models is essential in helping students eliminate this understanding. The use of a symbol to represent a number once cannot be used to represent another number in a different problem/situation. Presenting students with multiple situations in which they select the symbol and explain what it represents will counter this misconception.

Teaching Multiple Representations

Multiple Representations Framework

Concrete and Pictorial Representations	
Number Tape 	**to multiply by skip counting**
Array Model 	**To show multiplication facts for numbers 1-10**
Area Model 	**To show multiplication facts for numbers 1-10**
Grouping 	**To show division by grouping**

Assessment Framework

Unit 1 Assessment / Authentic Assessment Framework				
Assessment	**CCSS**	**Estimated Time**	**Format**	**Graded ?**
Chapter 6				
Pre-Test		½block	Individual	No
Authentic Assessment #5	3.NBT.2 and 3.0A.3	½block	Individual	Yes
Chapter Test/Review 6 + TP	3.OA.1 - 3.OA.8	1 block	Individual	Yes
Authentic Assessment #6	3.OA.4	½block	Individual	Yes
Authentic Assessment #7	3.OA.5 and 3.OA.6	½block	Individual	Yes
Chapter 7 and 8				
Modified Chapter 7 & 8 Test/Review	3.OA.7, 3.OA.9	½ block	Individual	Yes
Authentic Assessment #8	3.OA.7	½block	Individual	Yes
Mini Assessment #3	3.OA.1-4	½block	Individual	Yes
Mini Assessment #4	3.OA.9	½block	Individual	Yes
Chapter 12				
Pre-Test		½block	Individual	No
Chapter Test/Review 12 + TP	3.MD.2	1 block	Individual	Yes
Authentic Assessment #9	3.MD.2	½block	Individual	Yes
Mini Assessment #5	3.MD.2	½block	Individual	Yes
Chapter 13				
Pre-Test		½block	Individual	No
*Chapter **13a** Test/Review*	3.MD.3	½ Block	Individual	yes
Authentic Assessment #10	3.MD.3	½block	Individual	Yes

	PLD	**Genesis Conversion**
Rubric Scoring	PLD 5	100
	PLD 4	89
	PLD 3	79
	PLD 2	69
	PLD 1	59

Authentic Assessment #5 – Classroom Supplies

Name:_____

Your teacher was just awarded $1,000 to spend on materials for your classroom. She asked all 20 of her students in the class to help her decide how to spend the money. Think about which supplies will benefit the class the most.

Supplies	**Cost**
A box of 20 markers	$5
A box of 100 crayons	$8
A box of 60 pencils	$5
A box of 5,000 pieces of printer paper	$40
A package of 10 pads of lined paper	$15
A box of 50 pieces of construction paper	$32
Books and maps	
A set of 20 books about science	$250
A set of books about the 50 states	$400
A story book (there are 80 to choose from)	$8
A map: there is one of your city, one for every state, one of the country, and one of the world to choose from	$45
Puzzles and games	
Puzzles (there are 30 to choose from)	$12
Board games (there are 40 to choose from)	$15
Interactive computer games (math and reading)	$75
Special Items	
A bean bag chair for the reading corner	$65
A class pet	$150
Three month's supply of food for a class pet	$55
A field trip to the zoo	$350

Write down the different items (at least one from each category) and how many of each you would choose. Find the total for each category.

- Supplies
- Books and maps
- Puzzles and games
- Special items

Authentic Assessment #5 Scoring Rubric: Classroom Supplies

3.OA.A.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.

3.NBT.A.2: Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematical Practice: 1 and 6

SOLUTION:

Solutions will vary. Here is one possible set of solutions.

8 boxes of markers will cost 8×5=4×2×5=4×10=40 dollars.
4 boxes of crayons will cost 4×8=4×4×2=16×2=10×2+6×2=20+12=32 dollars.
2 boxes of pencils will cost 2×5=10 dollars.
1 box of printer paper costs 40 dollars.
2 packages of lined paper cost 2×15=2×10+2×5=20+10=30 dollars.
3 boxes of construction paper cost 3×32=3×30+3×2=90+6=96 dollars.
The total for the supplies is 40+32+10+40+30+96=248 dollars.
12 books cost 12×8=10×8+2×8=80+16=96 dollars.
The total cost for the books and maps is 250+96+45=391 dollars.
The total cost for the puzzles and games is 10×12+6×15=120+3×30=120+90=210 dollars.
The total for the special items is 130 dollars.

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
Clearly constructs and communicates a complete response based on explanations/reasoning using (the): • properties of operations • relationship between addition and subtraction • place value • multiplication Response includes an **efficient** and logical progression of steps.	Clearly constructs and communicates a complete response based on explanations/reasoning using (the): • properties of operations • relationship between addition and subtraction • place value • multiplication Response includes a **logical** progression of steps	Constructs and communicates a complete response based on explanations/reasoning using (the): • properties of operations • relationship between addition and subtraction • place value • multiplication Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	Constructs and communicates an incomplete response based on explanations/reasoning using (the): • properties of operations • relationship between addition and subtraction • place value • multiplication Response includes an **incomplete or Illogical** progression of steps.	The student shows no work or justification

Authentic Assessment #6 – Finding the Unknown in a Division Equation

Name:_____

Tehya and Kenneth are trying to figure out which number could be placed in the box to make this equation true.

Tehya insists that 12 is the only number that will make this equation true.

Kenneth insists that 3 is the only number that will make this equation true.

$$2 = \square \div 6$$

Who is right? Why? Draw a picture to support your idea.

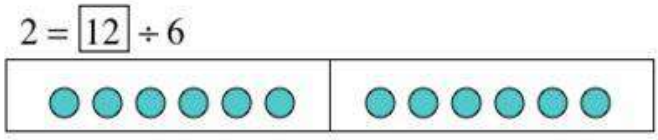
Authentic Assessment #6 Scoring Rubric – Finding the Unknown in a Division Equation

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 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?*

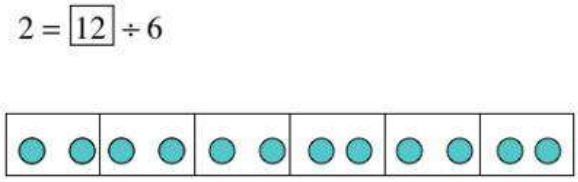
Mathematical Practice: 1 and 2

SOLUTION:

This solution shows that 12 split into groups of 6 will result in 2 groups.



This solution shows that 12 split into 6 equal groups will result in 2 in each group.



Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
Clearly constructs and communicates a complete response based on explanations/reasoning using (the): • Visual representations • relationship between multiplication and division Response includes an **efficient** and logical progression of steps.	Clearly constructs and communicates a complete response based on explanations/reasoning using (the): • Visual representations • relationship between multiplication and division Response includes a **logical** progression of steps	Clearly constructs and communicates a complete response based on explanations/reasoning using (the): • Visual representations • relationship between multiplication and division Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	Clearly constructs and communicates a complete response based on explanations/reasoning using (the): • Visual representations • relationship between multiplication and division Response includes an **incomplete or Illogical** progression of steps.	The student shows no work or justification

Authentic Assessment #7 – Amusement Park

Name:_____

Juan is having his birthday party at the amusement park. He and his friends have broken up into two equal groups of four, so that their parents can chaperone them easily. His mom has bought a total of 72 ride tickets for Juan and each of his friends. How many tickets will each group get? Use pictures, mathematical operations, and words to explain your answer.

Authentic Assessment #7 Scoring Rubric – Amusement Park

3.OA.5: Apply properties of operations as strategies to multiply and divide.[2] *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*

3.OA.6: Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8*.

Mathematical Practice:1, 3, 6

Type: Individual, Individual w/Interview

SOLUTION: **See below**				
Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
Student has an understanding of multiplication and division. Student correctly determines the amount of children (including Juan) to be 8. In addition, the student correctly identifies the total number of tickets needed to be is 72. The student correctly determines the amount of tickets each group gets is 36 (72 total tickets divided by 2 groups). The student then identifies that the amount of tickets per group (36) must be divided by the amount of people in each group (36/4). The students identifies that each person will get 9 tickets in each group (9x4 = 36). All of the information and explains his/her conclusion through the use of mathematical language, pictures and diagrams, and/or mathematical processes.		Student has an understanding of multiplication and division, however the student does not identify each the amount of tickets each student is to receive. Student has an understanding of dividing the amount of tickets (72) by 2 for the 2 groups, however does not identify what each student should get. The student shows his/her work, however, has limited explanation through	Student may determine how many children are at the party, but fails to figure out the total number of tickets that are needed. The student does not show work and has flaws in their approach to answer the problem.	Does not address task, unresponsive, unrelated or inappropriate.

		the use of language, pictures, diagrams, and/or mathematical processes.		
Clearly constructs and communicates a complete response based on explanations/reasoning using the: • Properties based on place value • properties of operations • relationship between addition and subtraction Response includes an **efficient** and logical progression of steps.	Clearly constructs and communicates a complete response based on explanations/ reasoning using the: • Properties based on place value • properties of operations • relationship between addition and subtraction Response includes a **logical** progression of steps	Constructs and communicates a complete response based on explanations/ reasoning using the: • Properties based on place value • properties of operations • relationship between addition and subtraction Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	Constructs and communicates an incomplete response based on explanations/ reasoning using the: • properties of operations • relationship between addition and subtraction Response includes an **incomplete or Illogical** progression of steps.	The student shows no work or justification

Authentic Assessment #8 – Cookie Dough

Name:_____

Clear Creek School is fundraising.

They are selling Cookie Dough in tubs.

Chocolate Chip Cookie Dough	Peanut Butter Cookie Dough	Oatmeal Cookie Dough
$5 a tub	$4 a tub	$3 a tub

1. Jill sold 2 tubs of Oatmeal Cookie Dough. How much did she raise?

2. Joe sold 4 tubs of Peanut Butter Cookie Dough and 4 tubs of Chocolate Chip Cookie Dough. How much money did her raise in all? Show how you figured it out.

3. Jade sold only Peanut Butter Cookie Dough and she raised $32. How many tubs did she sell? Show how you figured it out.

4. Jermaine's mother loves oatmeal cookies. She has $20 to spend. What is the greatest number of tubs of Oatmeal Cookie Dough she can buy? Explain how you figured this out.

Authentic Assessment #8 Scoring Rubric – Cookie Dough

3.OA.7: Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Mathematical Practice:1, 6

Type: Individual

SOLUTION:

1. $6

2. $36

3. 8 tubs

4. 6 tubs

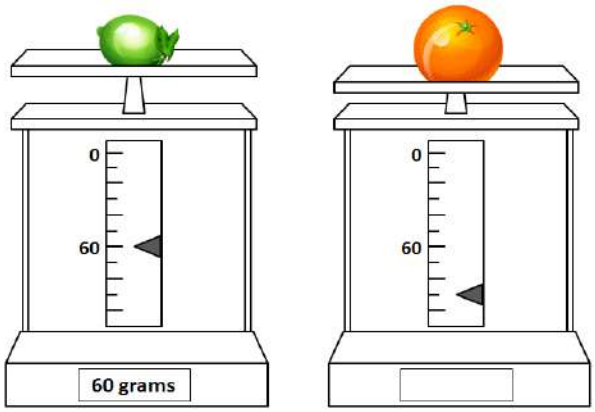
Level 5: **4 Correct Answers** **Distinguished Command**	**Level 4:** **3 Correct Answers** **Strong Command**	**Level 3:** **2 Correct Answers** **Moderate Command**	**Level 2:** **1 Correct Answers** **Partial Command**	**Level 1:** **No Correct Answers** **No Command**
Clearly constructs and communicates a complete response based on explanations/reasoning using the: • Properties of operations • Relationship between multiplication and division Response includes an **efficient** and logical progression of steps.	Clearly constructs and communicates a complete response based on explanations/ reasoning using the: • Properties based on place value • properties of operations • relationship between addition and subtraction Response includes a **logical** progression of steps.	Constructs and communicates a complete response based on explanations/ reasoning using the: • Properties of operations • Relationship between multiplication and division Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	Constructs and communicates anincomplete response based on explanations/ reasoning using the: • Properties of operations • relationship between multiplication and division Response includes an **incomplete or Illogical** progression of steps.	The student shows no work or justification

Authentic Assessment #9 – Weighing Fruit

Name:_____

Julius put a lime on the scale and found that it weighed 60 grams.

He used the same scale to weigh an orange.



About how much does the orange weigh? Explain how you found the weight of the orange using precise vocabulary.

Julius put three oranges in a bag.

If each orange was the same size as the one he weighed, about how much does the bag of oranges weigh? Explain how you found the weight using precise vocabulary.

Authentic Assessment #9 Scoring Rubric– Weighing Fruit

3.MD.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Type: Individual

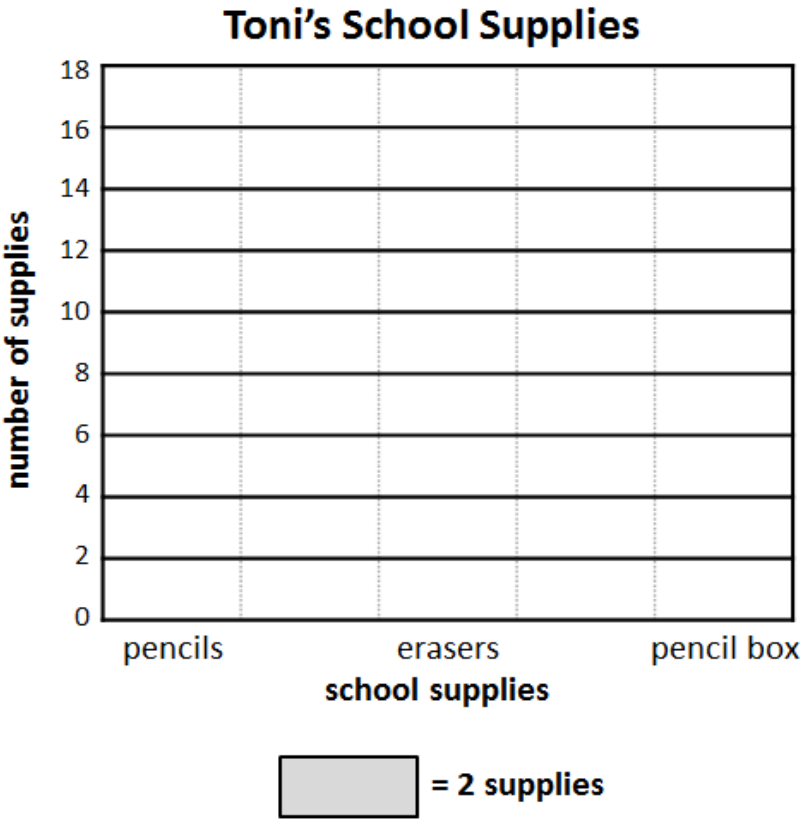
SOLUTION: **See Below**				
Level 5: **Distinguished Command**	**Level 4:** **Strong Command**	**Level 3:** **Moderate Command**	**Level 2:** **Partial Command**	**Level 1:** **No Command**
Student finds that the orange weighs about 90 grams. Student finds that the bag of 3 oranges weighs about 270 grams. Student clearly explains solution strategies using precise vocabulary. Response includes an **efficient** and logical progression of steps.	Student finds that the orange weighs about 90 grams. Student finds that the bag of 3 oranges weighs about 270 grams. Student clearly explains solution strategies using precise vocabulary. Response includes a **logical** progression of steps.	Student does 1-2 of the following: Student finds that the orange weighs about 90 grams. Student finds that the bag of 3 oranges weighs about 270 grams. Student partially explains solution strategies using some precise vocabulary. Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	Student does 1-2 of the following: Student finds that the orange weighs about 90 grams. Student finds that the bag of 3 oranges weighs about 270 grams. Student partially explains solution strategies using some precise vocabulary. Response includes an **incomplete or Illogical** progression of steps.	The student shows no work or justification

Authentic Assessment #10 – Toni's School Supplies

Name: _____

Toni's School Supplies

Toni bought four packs of school supplies. Each pack came with four pencils, three erasers, and one pencil box. Create a bar graph to show how many of each school supply Toni has.



Use your graph to answer each question.

1. How many school supplies does Toni have in all?_____

2. Toni wants to give each of the 21students in her class a pencil. How many more pencils will she need? Justify your answer using pictures numbers, or words.

3. What is another question that can be answered by looking at the data on the graph?

Authentic Assessment #10 Scoring Rubric– Toni's School Supplies

3.MD.3: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.

Type: Individual

SOLUTION: **See Below**				
Level 5: **Distinguished Command**	**Level 4:** **Strong Command**	**Level 3:** **Moderate Command**	**Level 2:** **Partial Command**	**Level 1:** **No Command**
Student correctly organizes data on graph (pencils: 16, erasers: 12, pencil boxes: 3) Student identifies that there are 31 total school supplies. Student identifies that 5 more pencils are needed. Response includes an **efficient** and logical progression of steps.	Student correctly organizes data on graph (pencils: 16, erasers: 12, pencil boxes: 3) Student identifies that there are 31 total school supplies. Student identifies that 5 more pencils are needed. Response includes a **logical** progression of steps.	Student does 1-2 of the following: Organizes data on graph with few errors Identifies that there are 31 total school supplies. Identifies that 5 more pencils are needed. Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	Student does 1-2 of the following: Organizes data on graph with few errors Identifies that there are 31 total school supplies. Identifies that 5 more pencils are needed. Response includes an **incomplete or Illogical** progression of steps.	Student is unable to graph data on the graph. Student does not identify total number of supplies. Student does not identify that 5 more pencils are needed.

Word Problem Bank

1. Janet needs to buy 9 t-shirts for the basketball teams. If there are 3 t-shirts in each pack, how many packs of t-shirts should Janet buy?
2. A librarian took 21 children's books and arranged them in stacks of 3. How many stacks did the librarian make?
3. Daniel's mom had 18 socks in the laundry basket to fold into pairs. How many pairs of socks did she make?
4. Kendra is tying strings on balloons to decorate for a party. She bought 25 meter of ribbon, and it takes 5 meters of ribbon for each balloon. How many balloons can Kendra tie strings to?
5. Nina can practice a song 6 times in an hour. If she wants to practice the song 30 times before the recital, how many hours does she need to practice?
6. Liam is cooking potatoes. The recipe says you need 5 minutes for every pound of potatoes you are cooking. How many minutes will it take for Liam to cook 12 pounds of potatoes?
7. There are 28 Easter eggs in the classroom. The teacher puts them in groups of 4. How many groups of eggs are in the classroom?
8. Three friends are given a pack of jelly beans to share equally. The pack contains 18 jelly beans. How many jelly beans should each person get?
9. Dana has 30 flowers. She wants to put them in vases of 5 flowers each. How many vases will Dana be able to make?
10. Mr. Fernandez is putting tiles on his kitchen floor. There are 2 rows with 9 tiles in each row. How many tiles are there in all?
11. In Jillian's garden, there are 3 rows of carrots, 2 rows of string beans, and 1 row of peas. There are 8 plants in each row. How many plants are there in all?
12. Maya visits the movie rental store. On one wall, there are 6 DVDs on each of 5 shelves. On another wall, there are 4 DVDs on each of 4 shelves. How many DVDs are there in all?
13. The art teacher has 48 paintbrushes. She puts 8 paintbrushes on each table in her classroom. How many tables are in her classroom?
14. Ricardo has 2 cases of video games with the same number of games in each case. He gives 4 games to his brother. Ricardo ahs 10 games left. How many video game were in each case?
15. Patty has $20 to spend on gifts for her friends. Her mother gives her $5 more. If each gift cost $5, how many gifts can she buy?
16. Joe has a collection of 35 DVD movies. He received 8 of them as gifts. Joe bought the rest of his movies over 3 years. If he bought the same number of movies each year, how many movies did Joe buy last year?
17. Liz has 24 a 24 inch long ribbon. She cuts nine 2 inch pieces from her original ribbon. How much of the original ribbon is left?
18. Gavin saved $16 to buy packs of baseball cards. His father gives him $4 more. If each pack of cards cost $5, how many packs can Gavin buy?
19. Chelsea buys 8 packs of markers. Each pack contains the same number of markers. Chelsea gives 10 markers to her brother. Then, she has 54 markers left. How many markers were in each pack?
20. Each month for 5 months, Sophie makes 2 quilts. How many more quilts does she need to make before she has made 16 quilts?

Word Problem Questions for Lessons

CCSS: 3.OA.1

Zeke's Dog

Draw a picture and write an equation for each part of the task.

Part 1: Zeke's dog eats 3 cups of food a day. If Zeke goes away for 9 days how much food should he leave?

Part 2: If Zeke is staying away for 3 days less, how much food should he leave?

Part 3: Write a sentence explaining how you know that you are correct.

Football Game

Part 1: Kayla went to a football game. Her team scored 6 times, and got the extra point each time. A touchdown with an extra point is worth 7 points. How many points did her team score?

Part 2: If the other team scored 2 more times than her team and got 7 each time, how many points did they have? Write a sentence explaining how you know that you are correct.

Road Trip

Part 1: Cora went on a trip with her parents. She was bored at lunch and counted all the tires in the parking lot. If she counted 36 tires on cars, how many cars were in the parking lot?

Part 2: If 3 cars left before she counted, how many cars would have been there? How many tires? Write a sentence explaining your thinking.

3.OA.2

Bike Race

Ember rode in a bike race. Every 6 miles, she stopped for a drink of water at a water station. How many stops has she made after riding 48 miles?

How many stops has she made after riding 54 miles?

How many stops has she made after riding 60 miles?

Sherrin's Breakfast Melon

Sherrin cut a melon for her family to eat at breakfast. She cut it into 48 pieces. If there are 8 people who eat breakfast in her family and everyone eats the same amount, how many pieces would each person get?

What if 2 people did not come to breakfast, so only 6 people ate? How many pieces would each person get?

Additional Resources

Circles and Stars- Introduction to Multiplication

Time: ½ Block

Goals:

- Introduce the students to multiplication.
- write addition and multiplication sentences
- recognize how addition and multiplication relate.

Materials: -chart paper (2-3 sheets for teacher's use)
-markers (one for each student)
-dice (one for each student)
-paper (enough for class plus extra)
-worksheet/Assessment (one for each child)

Procedure:
1. As a whole group ask the question "what is multiplication?" and record the students' responses on chart paper.
2. Ask for one volunteer.
3. Have volunteer roll a die. (Example child rolls a five)
4. Draw that many circles. (Example five circles)
5. Have a second volunteer roll a die. (example child rolls a 3)
6. Draw that many stars in each circle. (Example 3 stars in 5 circles)
7. Write and addition sentence. (Example 3+3+3+3+3=15)
8. Say to children, "doesn't that take a long time to add three five times? There is an easier way to write this."
9. Write a multiplication sentence. (example 3x5=15)
10. Discuss how it gives you the same answer.
11. Repeat two or three times as a group.
12. Partner the children.
13. Pass out dice, paper and markers to each pair and give them directions:
    -each child gets one die
    -First person roll your die and draw that many circles
    -Second person roll your die and draw that many stars inside your partner's circles
    -as a pair write an addition sentence and multiplication sentence
14. Have children repeat a few times with their partner while you circulate around the room.

Closure: Regroup and discuss how each sentence (addition and multiplication) had the same answer and ask the children if they thought the new way of writing it was easier.

Assessment: Worksheet with circles and stars already made up and have children write an addition and multiplication sentence. Did children write the correct addition and multiplication sentences?

Modifications for Special Needs: If there is an assistant, have them work on the side with the child using a dry erase board providing them with one-on-one assistance. Otherwise, when children work in pairs go over and assist them.

Possible Extensions: Leave dice at a center for children to get extra practice with. Encourage children to do this activity at home.

Amanda Bean's Amazing Dream

Overview/Rationale:

By showing examples of multiplication in different contexts, *Amanda Bean's Amazing Dream*

helps children understand what multiplication is and gives them a compelling reason for

learning to use this basic operation of arithmetic.

Suggested Time: 45-60 minutes

Organization of Instruction: Students are in Pairs

Materials/Resources Needed:

- Tiles
- Counters
- Kit-kats (or visual aid of kit kats)

Introduction:

- Ask children what they know about multiplication
- Read *Amanda Bean's Amazing Dream*
- After reading the book through – go back to some of the pages and ask the student's questions about different ways to count the objects (see questions at end of book)
- Try to elicit strategies other than just counting.
  Introduce the students to the riddle game of "which has more" using the following problem:
  Which has more panes – a window with 5 rows and 4 panes in each row or a window with 3 rows and 6 panes in each?
- First have the children guess which one has more
- Encourage them to use colored tiles or graph paper to solve!

Exploration:

- Have students work in pairs on the following riddles (supply colored tiles and counting objects as well as paper and pencils.

Which has more?

Which has more rooms – a building with 4 floors and 6 rooms on each floor or a building with 4 floors and 5 rooms on each?

Which has more cookies – 3 rows with 8 cookies in each row of 4 rows with 6 cookies in each?

Which has more wheels – 3 tricycles or 7 bicycles?

Which has more legs – 8 cows or 10 chickens?

Which has more books – 5 rows with 6 in each row or 6 rows with 5 in each row?

- Circulate and help students who are stuck and guide them towards using different manipulatives
- Special needs/second graders – supply pictures to accompany riddles.

Summary

- Have children present their findings in a class discussion – have many different students share their strategies.
- Discuss problems that had the same answer and why this occurred.

Assessment

Pose the following problem to individual students. Have a visual aid of five Kit-Kat bars – but only have one of the bars open. This way children will not be able to use the strategy of counting.

I bought five Kit-Kat bars. There are four chocolate sticks in each bar. How many chocolate sticks in all? Do we have enough for every student in the class to have a piece?

THE DOORBELL RANG LESSON PLAN & ACTIVITY

Literature

The Doorbell Rang by Pat Hutchins, is a great book to use when teaching division to third graders. The story is about two children who eagerly anticipate equally sharing twelve cookies. However, just as they are about to consume their delicious treats the doorbell rings, two children join them at the kitchen table, and they have to re-calculate even distribution of the sweet treats. Just as they are about to indulge in the scrumptious cookies, the doorbell rings again, and again they must re-distribute their snacks. This continues until there are twelve children sitting around the table and twelve cookies split among them. Then, once again, the doorbell rings…

Lesson Plan

Topic-Equal Shares

Standard-3.OA.2. Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 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 partitioned into equal shares of 8 objects each.

Materials-

The Doorbell Rang by Pat Hutchins
Individual white boards or pencil and paper

Lesson Structure-

Introduction-

Read story *The Doorbell Rang* by Pat Hutchins

Teach and Model-

Predict the distribution of cookies after each doorbell rings
Question/validate student thinking

Guided Practice-

Ask students to explain how they would divide 12 cookies equally between two kids, among 4 kids, among 6 kids, and among 12 kids. Illustrate the students' thinking on the board. Use student explanations to show that 12 ÷ 2 is the same as 6 x 2 and 6 + 6; and other divisors work the same way.

Independent Practice Activity-

The following story problem is a good activity to teach this division concept: You and seven classmates go bowling. You purchase 24 cookies, 2 pizzas cut into eight slices each, and a 32 ounce pitcher of soda. How many cookies, slices of pizza and four ounce glasses of soda will you and each of your guests get? Ask students to explain solution to the problem after everyone has had time to work it through.

Closure-

Instruct students to write in their math journals an explanation and illustration of "equally divided"

EACH ORANGE HAD 8 SLICES: A COUNTING BOOK

Introduction:

1. Explain that students will be writing their own math problems after you read the book: "As I read, pay attention to the problems that the author poses on each page and think about how you would solve them"
2. After reading about 5 pages – ask "who would like to tell us what kinds of things you've noticed about the book so far? (multiplication, have to multiply 3 numbers)
3. Stop at page that shows four trees, three bird's nests in each tree and two spotted eggs in each next – ask how many trees? How many birds nests? How many spotted eggs in all? How do you know?
4. Discuss the types of questions the author asks at the end of each problem, three questions, the big question at the end asks about the total number of the last thing, like wheels
5. Make a chart with 5 columns – ask a student to read aloud from their favorite page: as they read, record 1^{st} line in 1^{st} column, 2^{nd} line in 2^{nd} column, 3^{rd} line in 3^{rd} column, 4^{th} column write 3 questions, 5^{th} column write multiplication sentence
6. If you were the author of our own story what would you write?

Development:

7. have students create their own page for the book –they draw the picture and write the sentences (as was done in the book)
8. when they are done, have them write the multiplication sentences on an index card and tape the card to the back of their page

Conclusion:

9. students share pages from their book – the rest of the class says their multiplication sentence

Assessment:

On my way to the store I saw 4 trees. Each tree had 3 birds' nests. Each bird had 2 spotted eggs. How many trees were there? How many bird's nests were there? How many spotted eggs were there in all?