Grade: 4

Module: 1

Title: "Multiply, Divide, and Conquer"

Date: 2013-2014

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Module 1 Title: **"Multiply, Divide, and Conquer"**

Conceptual Lens: **Relationships**

Place Value (PV)

- Written Form
- Pictorial Form
- Expanded Form
- Standard Form
- Estimation
- Comparing
- Addition and Subtraction
- Rounding

Module 1 Title:
"Multiply, Divide, and Conquer'"

Multiplication (M)

- Properties
- Variables
- Area Models
- Set Models
- Arrays
- Number Lines
- Equations
- Standard Algorithm
- Mental Computation
- Inverse Relationship
- Multiplicative Comparison
- Word Problems
- Reasonable Solutions

Division (D)

- Properties
- Variables
- Area Models
- Set Models
- Arrays
- Number Lines
- Equations
- Standard Algorithm
- Mental Computation
- Inverse Relationship
- Remainders
- Solutions
- Partial Quotients
- Word Problems
- Reasonable Solutions

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Module Title: "Multiply, Divide, and Conquer"

Conceptual Lens: Relationships

Module Overview

In Module 1, students will extend their understanding of place value concepts to read, write, compare, order, estimate, and round whole numbers to numerals through the millions place. They will apply place value concepts as strategies for solving problems involving addition, subtraction, and multiplication and division by multiples of ten. Students will multiply and divide multi-digit numbers using a variety of strategies and properties of operations that include the use of concrete models, pictorial representations, and equations in order to solve real-world problems. The students will apply their knowledge of place value, strategies, and properties of operations to justify the rationality of their answers.

Technology Integration (What skills do teachers and students need to use this? How much knowledge or familiarity with the use of the internet and tools are necessary?)

Teachers should be proficient utilizing interactive white boards, technology, and internet resources, such as Thinkcentral, and other websites that provide interactive math tools. Teachers should also demonstrate knowledge of administering online testing, interpreting data, and selecting computer-based activities for students.

Standards for Mathematical Content addressed in this unit:

4.NBT.1
4.NBT.2
4.NBT.3
4.NBT.4
4.NBT.5
4.NBT.6
4.OA.2
4.OA.3

Standards for Mathematical Practice addressed in this unit:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

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Module Title: "Multiply, Divide, and Conquer"

Generalizations (G)	*Guiding Questions (F = Factual; C = Conceptual; P = Philosophical)*
1. Numbers derive their meaning based upon the place value of their digits. (PV)	a. What do you look at to find the value of a digit? (F) b. How can you find the value of a digit in a place? (C) c. How does a digit's position affect its value? (C) d. How can you explain the magnitude of a digit? (C) e. How can you show this number in expanded form? (F) f. How can you use expanded form to solve this problem? g. What conclusions can you make about the places within the base-ten number system? (P) h. What happens to the value of a digit in any place when the number is multiplied or divided by 10, 100, 1,000? (C) i. How do you use the values of the digits to compare two numbers? (C) j. How can you determine which number is the least or greatest in a set of numbers? (C) k. Why is it important to compare two numbers? (P) l. What is the appropriate symbol if two numbers that are being compared have the same value? (F) m. Which symbol would you use to compare these numbers (>, <, =)? (F) n. When you compare numbers, which place value do you look at first? (F)
2. Estimation determines the reasonableness of solutions. (PV, M, D)	a. What are some situations when estimation is useful? (C) b. What is the difference between an exact answer and an estimate? (C) c. What are some situations when an exact answer is needed instead of an estimate? (C) d. How can you use rounding to find a reasonable answer to a problem? (C) e. What is a reasonable answer to this problem? (F) f. How can I ensure that my answer is reasonable? (C) g. What are compatible numbers? (F) h. How do compatible numbers help you determine if an answer is reasonable? (C) i. What is a "rounded number"? (C) j. How are multi-digit numbers rounded? (C) k. How does rounding help you compute numbers? (C) l. How does understanding place value help you explain the method for rounding a number to any place? (C) m. In what situations do you need to "round up?" (C) n. Why do you need to estimate? (P)

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Generalizations (G)	*Guiding Questions (F = Factual; C = Conceptual; P = Philosophical)*
3. Application of place value concepts and properties of operations develops efficient procedures for adding and subtracting multi-digit whole numbers. (PV)	a. What strategies do you use to add and subtract multi-digit numbers? (C) b. What does "regrouping" mean? (F) c. When is regrouping needed in addition and subtraction? (C) d. Why do you line up the digits in columns when adding or subtracting vertically? (C) e. Would your answer be different if you used expanded form rather than standard form? (C) f. How do the expanded form/partial sums methods help you understand why the standard algorithm works? (C) g. How can you combine hundreds, tens, and ones in two or more numbers, efficiently? (C) h. How can you use place value to mentally add/subtract? (C)
4. Application of place value concepts and properties of operations develops efficient procedures for multiplying multi-digit whole numbers. (PV, M, D)	a. What real-life situations require the use of multiplication? (C) b. What are some methods for solving multiplication problems? (C) c. How do different models show factors and products? (C) d. How is the area model connected to a multiplication equation? (C) e. How can you solve a multiplication equation using expanded form? (C) f. How are equal groups represented in a multiplication equation? (C) g. How are arrays used to represent multiplication equations? (C) h. How can you show multiplication on a number line? (C) i. How can you use division to solve multiplication problems with an unknown factor? (C) j. What multiplication equation is modeled on this number line? (F)
5. Application of place value concepts and properties of operations develops efficient procedures for finding quotients involving multi-digit dividends. (PV, M, D)	a. What real-life situations require the use of division? (C) b. What are some methods for solving division problems? (C) c. How do models show the components of a division equation? (C) d. How is the area model connected to a division equation? (C) e. How can you solve a division equation using expanded form? (C) f. How are equal groups represented in a division equation? (C) g. How are arrays used to represent division equations? (C) h. How can you show division on a number line? (C) i. What is the meaning of a remainder in a division problem? (C) j. How do we interpret remainders in real life? (C) k. How are remainders and divisors related? (C) l. What effect does a remainder have on a rounded answer? (C) m. How can you use multiplication to solve division problems? (C) n. What division equation is modeled on this number line? (F)

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Generalizations (G)	*Guiding Questions* *(F = Factual; C = Conceptual; P = Philosophical)*
6. Word problems contain information that directs you to a problem solving plan. (PV, M, D)	a. What is the problem asking you to do? (C) b. How can you use the situation in a word problem to determine the best operation to use? (C) c. How can you use the information in a word problem to determine how many steps you will need to solve it? (C) d. How is an unknown represented in an equation? (F) e. How can you determine what is unknown in a multistep word problem? (C) f. How can you make an equation with an unknown when you have a multistep word problem? (C)
7. Effective mathematicians utilize appropriate tools and strategies to solve problems and justify solutions. (PV, M, D)	a. How can you prove that your solution was correct? (C) b. What strategies do you use to add and subtract multi-digit numbers? (C) c. What are some methods for solving multiplication problems? (C) d. What are some methods for solving division problems? (C) e. How can you use the situation in a word problem to determine the best operation to use? (C) f. How can you use the information in a word problem to determine how many steps you will need to solve it? (C) g. How can you determine what is unknown in a multistep word problem? (C) h. How can you represent this equation with a word problem?(C)

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Critical Content and Key Skills

Place Value
- Use place value concepts to add and subtract multi-digit numbers.
- Use place value concepts to multiply and divide multi-digit numbers.
- Use place value concepts to compare numbers.
- Use estimation strategies to check the reasonableness of answers.

Multiplication
- Use concrete models, pictorial representations, and equations using variables to solve problems.
- Use the Distributive Property to solve problems.
- Use given information and strategies to solve real-life word problems.
- Apply properties of multiplication to solve problems

Division
- Use concrete models, pictorial representations, and equations using variables to solve problems.
- Use given information and strategies to solve real-life word problems.
- Apply the inverse relationship to solve problems.

4.NBT.1	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 10 = 70, by applying concepts of place value and division.*
4.NBT.2	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
4.NBT.3	Use place value understanding to round multi-digit whole numbers to any place.
4.NBT.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.OA.2	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
4.OA.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.

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Suggested Timeline	*Learning Experiences*	*Assessments (Suggested and Required**)*	*Differentiation (For Support and Extension)*	*Resources*
Spiral throughout this module.	**Model the process of solving word problems involving all four operations. Move from single step to multi-step. (Problems should involve unknowns in different positions).** G: (3, 8, 4, 5) Introduce and explain George Polya's Problem-Solving Method: 1. Understand the problem. 2. Devise a plan. 3. Carry out the plan. 4. Look back and evaluate the answer. Multiplication Example: A red rod is 4 inches long. A green rod is 3 times as long as the red rod. How long is the green rod? Let *y* represent the green rod. 3 x (length of the red rod) = *y* 3 x (4 inches) = *y* *y* = 12 inches Division Example: The blue rod is 12 inches long. It is 3 times as long as the yellow rod. How long is the yellow rod? Let *n* represent the blue rod. 3 x *n* = 12 inches 12 inches ÷ 3 = 4 inches ***All learning experiences allow for student discourse.**	**Performance Task (End of Module) Teacher Observations Math Expressions Formative Assessment: *On-Going Assessments* *Quick Quizzes* *Unit Tests*	Math Expressions Units 1, 3, and 5: Refer to *Differentiated Instruction* pages in T.E. or on ThinkCentral. • Intervention Cards • Challenge Cards Intervention: *Online Soar to Success* Extension: *Online Destination Math*	• Grade 4 Unpacked Standards • ThinkCentral • 28 Learn Zillion Video Lessons Math Expressions • T.E. page 667K • Unit 1 Lesson 7 • Unit 3 Lesson 5 • Unit 5 Lesson 10 Hands-On Standards®, Common Core Edition, Grade 4. ETA hand2mind, © 2012.

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Suggested Timeline	*Learning Experiences*	*Assessments (Suggested and Required**)*	*Differentiation (For Support and Extension)*	*Resources*
Days 1-4	**Review connections to each place value in the base-ten system. Begin with concrete models, such as base-ten blocks. Then, have students make pictorial representations of a number. Finish with writing the expanded, written and standard forms of numbers.** G: (1) Provide multiple opportunities for students to build numbers using manipulatives (base-ten blocks, etc.) Put students in pairs and ask them to read numbers to a partner and then write the numbers in different forms. Give students examples of numbers in different forms and ask students to match different forms of the same number. ***All learning experiences allow for student discourse.**	Teacher Observations Math Expressions Formative Assessment: *On-Going Assessments* *Quick Quizzes* *Unit Tests*	Math Expressions Unit 3: Refer to *Differentiated Instruction* pages in T.E. or on ThinkCentral. • Differentiated Instruction Cards • Intervention: *Online Soar to Success* • Extension: *Online Destination Math*	• Grade 4 Unpacked Standards • ThinkCentral • 10 LearnZillion Video Lessons • engageny.grade-4--module-1 Math Expressions • T.E. pages 271P-271-R • Unit 3 Lessons 7 and 10 Hands-On Standards®, Common Core Edition, Grade 4. ETA hand2mind, © 2012.
Days 5-9	**Demonstrate how multiplying and dividing by 10 affects the magnitude of numbers. Begin with concrete models, move to pictorial representations, and then to abstract.** G: (1, 4, 5) Give students manipulatives to explore multi-digit numbers and place value patterns that occur when the same digit is moved to a different place value to the left or the right. Ask students to draw and explain the value of digits in multi-digit numbers and how those values change, based on place value, when the digit is moved to the left or the right. Ask students to investigate the patterns associated with the answers, such as the following: 7 x 10 7 x 100 7 x 1,000 70 ÷ 10 700 ÷ 10 7,000 ÷ 10 ***All learning experiences allow for student discourse.**			• Grade 4 Unpacked Standards • ThinkCentral • 7 LearnZillion Video Lessons Math Expressions • T.E. page 499O • Unit 5 Lesson 2 • Unit 7 Lesson 9 Hands-On Standards®, Common Core Edition, Grade 4. ETA hand2mind, © 2012.

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Suggested Timeline	*Learning Experiences*	*Assessments (Suggested and Required**)*	*Differentiation (For Support and Extension)*	*Resources*
Days 10-13	**Compare multi-digit numbers using place value and appropriate symbols. Begin with concrete models, move to pictorial representations, and then to abstract.** G: (1, 6) Model how to use the place values of multi-digit numbers to compare them. Allow students to verbalize strategies being used (i.e. look at the largest place value first) and use the correct symbols to compare (>, < , or =). Ask students use number cubes or number cards to generate a number. Students write both numbers down and use the correct symbol (>, < , or =) to show the comparison. Allow students opportunities to read, say, and write comparisons correctly. ***All learning experiences allow for student discourse.**	Teacher Observations Math Expressions Formative Assessment: *On-Going Assessments* *Quick Quizzes* *Unit Tests*	Math Expressions Unit 3: Refer to *Differentiated Instruction* pages in T.E. or on ThinkCentral. • Intervention Cards • Challenge Cards Intervention: *Online Soar to Success* Extension: *Online Destination Math*	• Grade 4 Unpacked Standards • ThinkCentral Math Expressions • T.E. pages 271P-271-R • Unit 3 Lesson 9 Hands-On Standards®, Common Core Edition, Grade 4. ETA hand2mind, © 2012. Module 1 Lesson (See Attached) *Ticket Master*
Days 14-18	**Round numbers to any place value. Begin with concrete models, move to pictorial representations, and then to abstract.** G: (2, 6) Ask students to locate a target number on the number line and determine the closest multiple of ten on both sides of the number. Provide students opportunities to choose the number that is closer to the target number. *(For example, 233 rounded to the nearest ten is 230 and 233 rounded to the nearest hundred is 200.)* Show populations of different cities and ask students to estimate how many people are in each city. ***All learning experiences allow for student discourse.**			• Grade 4 Unpacked Standards • ThinkCentral • 5 LearnZillion Video Lessons Math Expressions • T.E. pages 271P-271-R • Unit 3 Lesson 8 Module 1 Lesson (See Attached) *Compatible Numbers To Estimate* Hands-On Standards®, Common Core Edition, Grade 4. ETA hand2mind, © 2012.

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Suggested Timeline	*Learning Experiences*	*Assessments (Suggested and Required**)*	*Differentiation (For Support and Extension)*	*Resources*
Days 19-23	**Relate place value to adding and subtracting multi-digit numbers. Begin with concrete models, move to pictorial representations, and then to abstract.** G: (3, 1, 6) Ask students to use manipulatives to add and subtract multi-digit whole numbers, using place value understanding. Ask students to add and subtract multi-digit 1111111111 1111111111111111111111111111111111111111111111 1111111111111111111111111111111111111 1111111111111111111111111111111111111 1111111111111111111111111111111111111 1111111111numbers, using place value pictures and drawings. Model mental math strategies for addition and subtraction. Provide students opportunities to use the standard algorithm to fluently add and subtract multi-digit numbers. ***All learning experiences allow for student discourse.**	Teacher Observations Math Expressions Formative Assessment: *On-Going Assessments* *Quick Quizzes* *Unit Tests*	Math Expressions Unit 3: Refer to *Differentiated Instruction* pages in T.E. or on ThinkCentral. • Intervention Cards • Challenge Cards Intervention: *Online Soar to Success* Extension: *Online Destination Math*	• Grade 4 Unpacked Standards • ThinkCentral Math Expressions • T.E. pages 271L-271-N • T.E. pages 271S-271-T • Unit 3 Hands-On Standards®, Common Core Edition, Grade 4. ETA hand2mind, © 2012.

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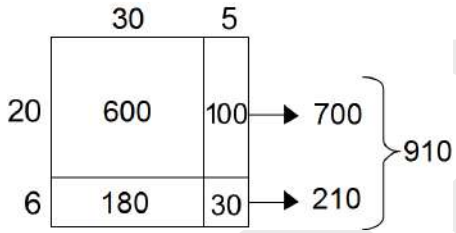
Suggested Timeline	*Learning Experiences*	*Assessments (Suggested and Required**)*	*Differentiation (For Support and Extension)*	*Resources*
Days 24-33	**Model multi-digit whole number multiplication using arrays, area models, properties, and open number lines. Begin with concrete models, move to pictorial representations, and then to abstract.** G: (4, 1, 6, 7) Model the Distributive Property, allowing students to opportunity to decompose (break apart) multi-digit numbers into base-ten units to be computed, and then combined.  35 x 26 = (30 + 5) x (20 + 6) = (30 + 5) x 20 + (30 + 5) x 6 = 30 x 20 + 5 x 20 + 30 x 6 + 5 x 6 Give the students a model similar to the one above. Ask students to write both the multiplication and division equations that are represented. ***All learning experiences allow for student discourse.**	Teacher Observations Math Expressions Formative Assessment: *On-Going Assessments* *Quick Quizzes* *Unit Tests*	Math Expressions Unit 5: Refer to *Differentiated Instruction* pages in T.E. or on ThinkCentral. • Intervention Cards • Challenge Cards Intervention: *Online Soar to Success* Extension: *Online Destination Math*	• Grade 4 Unpacked Standards • ThinkCentral • 10 LearnZillion Video Lessons Math Expressions • T.E. pages 499L-499-N • Unit 5 Module 1 Lessons (See Attached) *At The Circus* *School Store* Hands-On Standards®, Common Core Edition, Grade 4. ETA hand2mind, © 2012.

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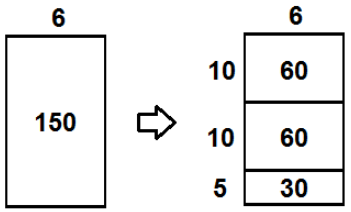
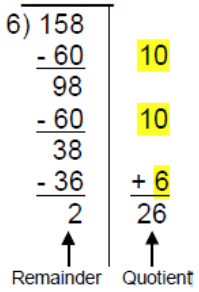
Suggested Timeline	*Learning Experiences*	*Assessments (Suggested and Required**)*	*Differentiation (For Support and Extension)*	*Resources*
Days 34-43	**Model division using arrays, area models, properties, and open number lines. Begin with concrete models, move to pictorial representations, and then to abstract.** G: (5, 1, 6, 7) Provide students real-life situations that divide showing place value. For example, four students will share $56, using place concepts of division. Use manipulatives to build arrays and area models, in order to divide numbers.  Provide students opportunities to divide by subtracting groups of the divisor from the dividend.  ***All learning experiences allow for student discourse.***	Teacher Observations Math Expressions Formative Assessment: *On-Going Assessments* *Quick Quizzes* *Unit Tests* **Performance Task	Math Expressions Unit 7: Refer to *Differentiated Instruction* pages in T.E. or on ThinkCentral. • Intervention Cards • Challenge Cards Intervention: *Online Soar to Success* Extension: *Online Destination Math*	• Grade 4 Unpacked Standards • ThinkCentral • 10 LearnZillion Video Lessons Math Expressions • T.E. page 667K • Unit 7 Module 1 Lessons (See Attached) *What is 2500 ÷ 300* *It's in the Numbers* *The School Newspaper* Hands-On Standards®, Common Core Edition, Grade 4. ETA hand2mind, © 2012.

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Culminating Unit Assessment

WHAT?

WHY?

HOW?

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Practice Task: Ticket Master

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

BACKGROUND KNOWLEDGE

Students should have had prior experiences and/or instruction with ordering large numbers. This activity may be used as an assessment or as an independent follow-up activity for reinforcement or review

ESSENTIAL QUESTIONS

- How can we compare large numbers?
- What determines the value of a number?
- Why is it important for me to be able to compare numbers?

MATERIALS

- Tickets
- Paper bag
- "Ticket Master" Recording Sheet

GROUPING

Partner Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students order and compare 6-digit numbers found on preprinted ticket stubs. They will place them in ascending and/or descending order. Then they will compare two numbers using a greater than (>), less than (<), or equal to (=) symbol.

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Comments

Part 1

Paper bags with tickets inside should be prepared ahead of time. You can purchase tickets at an office supply store or ask for a donated roll of tickets from activities that use them (raffles, bingo nights, school plays, etc). If purchasing or donations are not an option, you can use the master provided in this task to print tickets. Tickets should be the style that has a duplicate attached to each ticket. For this activity, ten tickets and their duplicates will be used. Detach and separate one set of ten tickets, but keep the duplicates attached to each other for students to use as an answer key. Place the ten separated tickets and one string of attached duplicate tickets inside a paper bag. You may want to laminate the tickets or print them on card stock for future use.

Part II

Students will need a bag of 20 detached tickets for Part II of this task. It may be advantageous to have separate plastic bags of 20 tickets for this game so that the detached tickets that match the string of attached tickets in Part 1 will not be mixed up.

Task Directions

Part I

Students will follow the directions below from the "Ticket Master" Recording Sheet.

- Open the bag of tickets and pour them out on your desk. You will find 10 detached tickets and one string of 10 tickets that has not been detached.
- Place the attached tickets to the side, face down.
- Take the detached tickets and arrange them in either descending or ascending order.
- Once you have completed this task, have a friend use the attached tickets to check your answers.

Part II

Play the game "Dare to Compare."
Players: 2 Players

Materials: One bag of 20 detached tickets "Dare to Compare" student recording sheet, pencil
Directions:

1. Each player places a pile of 10 tickets face down in front of them.
2. For each round, both players turn the top ticket in their piles face up and lay them on the table next to each other.
3. The player with the larger number on the ticket must correctly read aloud the number.
4. Both players record an inequality or equality statement using the numbers on the tickets.
5. The player with the higher number gets to keep both tickets and place them in a separate pile with the tickets face up.
6. At the end of ten rounds, the player with the most tickets wins.

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FORMATIVE ASSESSMENT QUESTIONS

- Explain your process for sorting your numbers?
- How can you tell which number is the largest or smallest?
- What do you do if two tickets have numbers with the same values?
- How could a place value chart help you order the numbers?
- What symbol would be appropriate to compare these two numbers? How do you know?

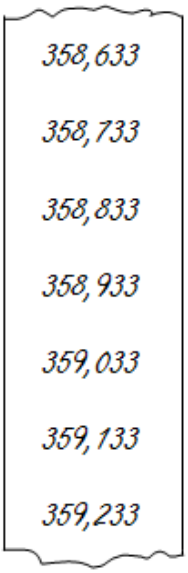
DIFFERENTIATION

Extension

- Create ticket strips (using the blank strip provided) that do not have sequential numbering. Have students practice putting in order-varied numbers, including numbers with fewer or more digits in them.

Intervention

- Have students use tickets with fewer digits in each number.
- Allow students to use a blank place value chart and write the numbers in the chart, showing the correct placement of the digits. This cueing device may assist students in comparing digits in the same place in order to determine value.



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Name _____ Date _____

Ticket Master

Part I

- Open the bag of tickets and pour them out on your desk. You will find 10 detached tickets and one string of 10 tickets that has not been detached.
- Place the attached tickets to the side, face down.
- Take the detached tickets and arrange them in either descending or ascending order.
- Once you have completed this part of the task, have a friend use the attached tickets to check your answers.

Part II

Play the game "Dare to Compare."
Players: 2 players
Materials: One bag of 20 detached tickets, "Dare to Compare" student recording sheet, and pencil

Directions:

1. Each player places a pile of 10 tickets face down in front of them.
2. For each round, both players turn the top ticket in their piles face up and lay them on the table next to each other.
3. The player with the larger number on the ticket must correctly read aloud the number.
4. Both players record an inequality or equality statement using the numbers on the tickets.
5. The player with the higher number gets to keep both tickets and place them in a separate pile with the tickets face up.
6. At the end of ten rounds, the player with the most tickets wins.

	My Ticket Number	**> < =**	**My Partner's Ticket Number**
Ex.	358,033	>	354,033
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

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Master Sheet for Tickets

365,344	365,345	365,346	365,347	365,348	365,349	365,350	365,351	365,352	365,353			
365,344	365,345	365,346	365,347	365,348	365,349	365,350	365,351	365,352	365,353			
365,344	365,345	365,346	365,347	365,348	365,349	365,350	365,351	365,352	365,353			
365,344	365,345	365,346	365,347	365,348	365,349	365,350	365,351	365,352	365,353			

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Name _____ Date _____

Ticket Master

Part I

- Open the bag of tickets and pour them out on your desk. You will find 10 detached tickets and one string of 10 tickets that has not been detached.
- Place the attached tickets to the side, face down.
- Take the detached tickets and arrange them in either descending or ascending order.
- Once you have completed this part of the task, have a friend use the attached tickets to check your answers.

Part II

Play the game "Dare to Compare."
Players: 2 players
Materials: One bag of 20 detached tickets, "Dare to Compare" student recording sheet, and pencil

Directions:

7. Each player places a pile of 10 tickets face down in front of them.
8. For each round, both players turn the top ticket in their piles face up and lay them on the table next to each other.
9. The player with the larger number on the ticket must correctly read aloud the number.
10. Both players record an inequality or equality statement using the numbers on the tickets.
11. The player with the higher number gets to keep both tickets and place them in a separate pile with the tickets face up.
12. At the end of ten rounds, the player with the most tickets wins.

	My Ticket Number	**> < =**	**My Partner's Ticket Number**
Ex.	358,033	>	354,033
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

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Constructing Task: At the Circus

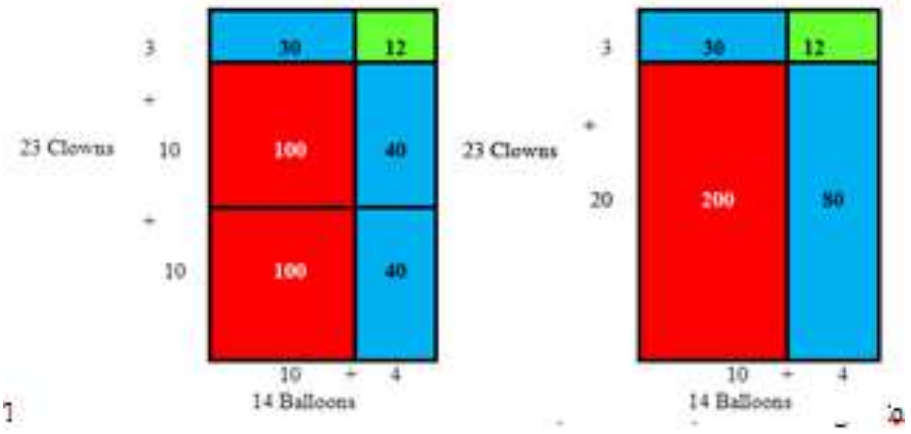
STANDARDS FOR MATHEMATICAL CONTENT

MCC4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MCC 4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.
MCC4.NBT.5 Multiply a whole number of up to four digits by one –digit whole number, and multiply two tow digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular, arrays, an /or area models.

BACKGROUND KNOWLEDGE

Students should understand how to use grid paper and partial products area models to determine multiplication products with numbers larger than 10. Use this task or another one similar to it to help students make the transition from depending on manipulatives for determining products of larger numbers to being able to determine these products through self-made diagrams.

Based on their understanding of base ten blocks, students should draw a model similar to either of these for the clown and balloons problem:



To get the final answer the students can add the areas:
100 + 100 + 30 + 40 + 40 + 12 = 322 or 200 + 80 + 30 + 12 = 322. There will be 322 balloons.

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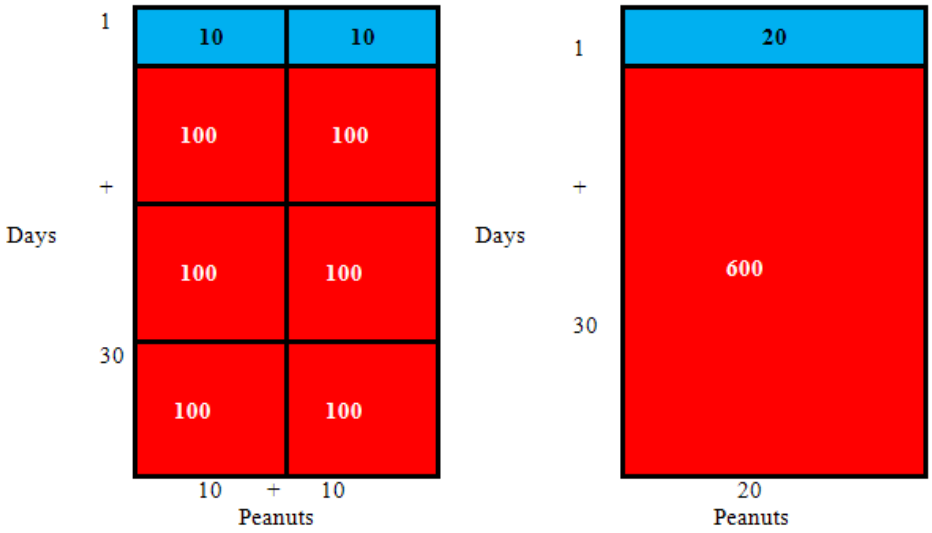
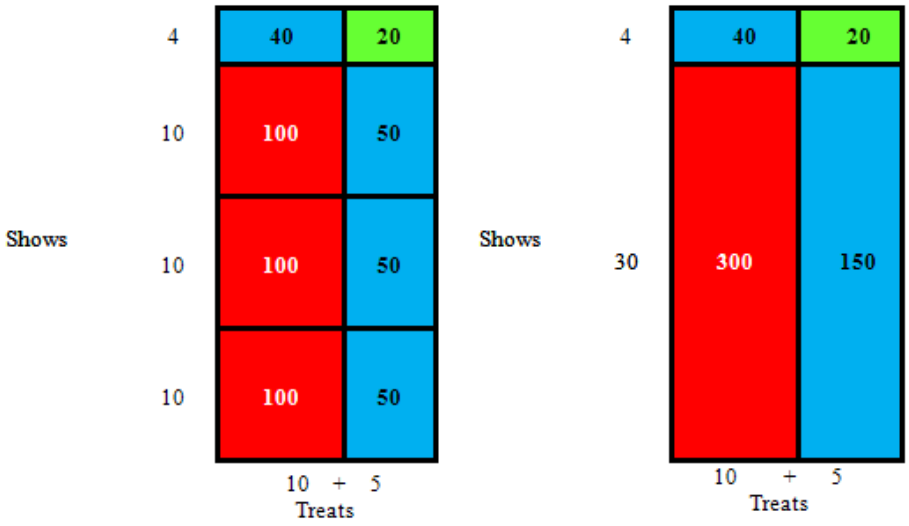
Below are two possible solutions for the Jumbo the elephant problem:



To get the final answer students can add the areas:
100 + 100 + 100 + 100 + 100 + 100 + 10 + 10 = 620 or 600 + 20 = 620.
Jumbo's trainer needs to carry 620 peanuts with him.

Below are two possible solutions for dancing bear family problem:



To get the final answer the students can add the areas:
100 + 100 + 100 + 50 + 50 + 50 + 40 + 20 = 510 or 300 + 150 + 40 + 20 = 510.
The dancing bear family will receive 510 treats from the trainer during 15 shows.

ESSENTIAL QUESTIONS

- How will diagrams help us determine and show the products of two-digit numbers?

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MATERIALS

- Colored pencils, markers, or crayons
- Centimeter Grid Paper
- "At the Circus" recording sheet

GROUPING

Partner or Individual Task

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task, students will make diagrams to discover and demonstrate the answers to 2-digit to 4-digit multiplication story problems.

Comments

This task provides opportunities for students to work with arrays in real world situations as they work with larger numbers. The recording sheet also asks students to develop a story problem of their own. The idea of moving beyond building arrays with base-ten blocks to drawing rectangles on paper or grid paper is critical. At this point students must begin to visualize the multiplication process without the blocks. As students begin to work, they may realize that modeling problems such as these can require a large number of base-ten blocks. Ask them to think of ways to do the same problem without having to utilize base-ten blocks.

Task Directions

Students will follow the directions below from the "At the Circus" recording sheet.

Solve the following problems. Show your thinking using words, pictures, and/or numbers.

1. There are 110 clowns at the circus. Each clown is carrying 14 balloons. How many balloons are there altogether?
2. The dancing bear family loves when their trainer gives them little treats to reward them for a good performance. If the trainer gives the dancing bear family 34 treats each show, how many treats will the trainer need for 220 shows?
3. Jumbo the elephant loves peanuts. His trainer gives him 20 peanuts every day. If they are going to be traveling for 134 days, how many peanuts should the trainer take with him?
4. Create your own circus problem and solution to share with the class.

FORMATIVE ASSESSMENT QUESTIONS

- How did you decide what size your diagrams should be?
- What are the dimensions of the array? How do you know?
- Describe what each dimension in your array represents.
- What groups are being counted in your word problem? How do you know?
- How many times is each group in your word problem being counted? How do you know?
- How are you using colors to keep your data organized?
- How can colors help you identify the number of groups and the number of times each group is counted?

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DIFFERENTIATION

Extension

- Ask students to try to solve a multiplication problem using a different method. (Students could try some of the strategies used to solve the problems on the "School Store" task.) Encourage students to apply another student's strategy to solve a given problem.

Intervention

- All students will not be ready at the same time to discontinue use of the base-ten manipulatives. The teacher will need to be conscientious about monitoring each student's level of understanding to know when the student will be ready to transition to diagrams without manipulative support. If students experience frustration or uncertainty during this process, the manipulatives should be kept available for use as reinforcement or as a way to check the diagram.

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Name_____ Date _____

At the Circus

Solve the following problems. Show your thinking using words, pictures and/or numbers.

1. There are 23 clowns at the circus. Each clown is carrying 110 balloons. How many balloons are there altogether?	2. The dancing bear family loves when their trainer gives them little treats to reward them for a good performance. If the trainer gives the dancing bear family 34 treats each show, how many treats will the trainer need for 220 shows?
3. Jumbo the elephant loves peanuts. His trainer gives him 20 peanuts every day. If they are going to be traveling for 134 days, how many peanuts should the trainer take with him?	4. Create your own circus problem and solution to share with the class.

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Constructing Task: School Store

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret35 = 5 × 7 as a statement that 35 is 5times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
MCC4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MCC 4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.
MCC4.NBT.5 Multiply a whole number of up to four digits by one–digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular, arrays, and /or area models.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

BACKGROUND KNOWLEDGE

	Unknown Product	**Group Size Unknown ("How many in each group?" Division**	**Number of Groups Unknown ("How many groups?" Division)**
	3 x 6 =?	**3 x ? = 18 , and 18 ÷ 3 = ?**	**? x 6 = 18 , and 18 ÷ 6 = ?**
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example*. You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example*. You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example*. You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?

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Arrays Area	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example*. You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example*. You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example*. You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? Measurement example. A rubber band is 6 cm long. How long will the	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? Measurement example. A rubber band is stretched to be 18 cm long and	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? Measurement example. A rubber band was 6 cm long at first. Now it is
General	a x b =?	a x ? = p , and p ÷ a = ?	? x b = p , and p ÷ b = ?

ESSENTIAL QUESTIONS

- How can I effectively explain my mathematical thinking and reasoning to others?
- What patterns do I notice when I am multiplying whole numbers that can help me multiply more efficiently?
- What real life situations require the use of multiplication?
- How can I use the situation in a story problem to determine the best operation to use?

MATERIALS

- "School Store" recording sheet

GROUPING

Partner or Individual Task

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Students explore their understanding of multiplication and how it applies to multiplying 1-digit and 2 digit numbers by up to 4-digit whole numbers.

Comments

This is an opportunity for students to use what they know about multiplication to find the product of 1-digit and 2-digits by up to 4-digit whole numbers. This task should be completed **before** students have any experiences with the standard algorithm for multiplying two digit numbers.

There should be no instruction on how to multiply 1 to 2 digit by up to 4-digit before giving students this problem. An example of how students may solve this type of problem is provided below.

As students work on this problem, talk with the students about their thinking and how they

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know their answers are correct. Also, it is important for students to share their thinking with their classmates

Task Directions

Students will follow the directions below from the "School Store" recording sheet.

Use what you know about multiplication to solve the following problems.

1. Jeni sells 125 pencils each day at the school store. How many pencils will she sell after 14 days?
2. Marquis runs the school store. He noticed they sold around 521 pens every day. If he wants to order as few pens as possible to get through 4 weeks of school, how many pens should he order?
3. There are 1,647 students at Eagle Creek Elementary School. Sixty-eight students shopped at the Eagle's Nest school store each day. How many students shopped at the school store after 45 days?

Below is one possible way students can solve the problems for this task.

This standard calls for students to translate comparative situations into equations with an unknown and solve.

Students need many opportunities to solve contextual problems.

Examples:

Unknown Product: A blue scarf costs $3. A red scarf costs 6 times as much. How much does the red scarf cost? (3 x 6 = p).

Group Size Unknown: A book costs $18. That is 3 times more than a DVD. How much does a DVD cost? (18 ÷ p = 3 or 3 x p = 18).

Number of Groups Unknown: A red scarf costs $18. A blue scarf costs $6. How many times as much does the red scarf cost compared to the blue scarf? (18 ÷ 6 = p or 6 x p = 18).

When distinguishing multiplicative comparison from additive comparison, students should note that Additive comparisons focus on the difference between two quantities (e.g., Deb has 3 apples and Karen has 5 apples. How many more apples does Karen have?). A simple way to remember this is, "How many more?"

Multiplicative comparisons focus on comparing two quantities by showing that one quantity is a specified number of times larger or smaller than the other (e.g., Deb ran 3 miles. Karen ran 5 times as many miles as Deb. How many miles did Karen run?). A simple way to remember this is "How many times as much?" or "How many times as many?"

FORMATIVE ASSESSMENT QUESTIONS

- How are you thinking about this problem?
- How do you know your answer is correct?
- What strategies are you using to solve this problem?
- What properties of multiplication have you used to solve this problem?

DIFFERENTIATION

Extension

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- Have students show as many different representations as they can and develop additional strategies as needed.
- Have students practice each of the strategies with numbers in the hundreds and thousands. Numbers larger than this can usually be handled with the use of the calculator, which should also be introduced once students have mastered the basic algorithm.

Intervention

- Have students solve the problem by inserting smaller numbers into the problem, then having them to choose two of the strategies to solve the problems

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Name_____Date_____

School Store

Use what you know about multiplication to solve the following problems. Jeni sells 125 pencils each day at the school store. How many pencils will she sell after 14 days?

1. Marquis runs the school store. He noticed they sold around 521 pens every day. If he wants to order as few pens as possible to get through 3 weeks of school, how many pens should he order?

2. There are 1,647 students at Eagle Creek Elementary School. Sixty-eight students shopped at the Eagle's Nest school store each day. How many students shopped at the school store after 45 days?

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Constructing Task: Compatible Numbers to Estimate

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and on e-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

BACKGROUND KNOWLEDGE

Compatible numbers are easy to use and are chosen to simplify the calculation of an estimate. Students should understand that sensibly chosen compatible numbers are not right or wrong, though some may yield better estimates than others. For example, the quotient 407 ÷ 5 may usefully be estimated using the compatible numbers 400 ÷ 5, 420 ÷ 6, 350 ÷ 7, 400 ÷ 4, or any of several other pairs. The first two, however, yield estimates closer to the actual quotient than the others do.

ESSENTIAL QUESTIONS

- How can I mentally compute a division problem?
- What are compatible numbers and how do they aid in dividing whole numbers?

MATERIALS

- "Compatible Numbers" recording sheet

GROUPING

Individual or partner

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TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Comments

Ask students how they could estimate the number of small prizes each of Mr. Wong's 9 students would receive if he had exactly 893 prizes to give away. If no one mentions compatible numbers, remind the class that they can estimate the answer to a problem by replacing the numbers in the problem with numbers that are easier to calculate with. Such easier numbers are called compatible numbers. You might show these two examples of compatible numbers:

- To estimate 3,456 ÷ 7, students might recognize 3,456 is close to 3,500 and choose compatible numbers 3,500 and 7. So, 3,456 ÷ 7 is about 3,500 ÷ 7, or 500.

Task Directions

Students will follow the directions below from the "Compatible Numbers" recording sheet.

1. Mr. Wong has between 300 and 1,000 small prizes to divide evenly among his 9 students over the course of the school year. He will give away as many prizes as possible. Estimate the number of small prizes each of Mr. Wong's 9 students would receive if he had exactly 893 prizes to give away.
2. At Hatfield Elementary School, there are 504 students in 7 classes. Each class has the same number of students. What is a good estimate of the number of students in each class? Explain your reasoning.
3. Marcel worked 9 hours and earned $232. What is a good estimate of the amount that he earned each hour? Explain your reasoning.

FORMATIVE ASSESSMENT QUESTIONS

- What compatible numbers are you using?
- How did these compatible numbers make solve the problem easier?
- Do you think that is a reasonable estimate? Why?

DIFFERENTIATION

Extension

- Have students solve the following problem with an estimate which fits the context. Mr. Wong has between 300 and 1,000 small prizes to divide evenly among his 9 students over the course of the school year.. He will give away as many prizes as possible. What is the greatest number of prizes that could be left over? Is it possible for each student to get 200 prizes?

Intervention

- Have students link basic division facts to identifying compatible numbers. You can begin with 35 ÷ 7, then 350 ÷ 7. Make explicit the connection of the compatibility between 35 and 7 and how it can be applied to 350 and 7.

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Name_____Date _____

Compatible Numbers

Use compatible numbers to help you estimate the answers for the following problems.

1. Mr. Wong has between 300 and 1,000 small prizes to divide evenly among his 9 students over the course of the school year. He will give away as many prizes as possible. Estimate the number of small prizes each of Mr. Wong's 9 students would receive if he had exactly 893 prizes to give away.

2. At Hatfield Elementary School, there are 504 students in 7 classes. Each class has the same number of students. What is a good estimate of the number of students in each class? Explain your reasoning.

3. Marcel worked 9 hours and earned $232. What is a good estimate of the amount that he earned each hour? Explain your reasoning.

Georgia Department of Education
Dr. John D. Barge, State School Superintendent May 2012
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Constructing Task: What is 2,500 ÷ 300?

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
MCC4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MCC 4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.
MCC 4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

BACKGROUND KNOWLEDGE

When students simply memorize the rule to simplify division involving the numbers ending with zeroes by eliminating the same number of 0s from both numbers, they often produce an incorrect answer as shown in this problem. They do not realize that 2,500 ÷ 300 and 25 ÷ 3 are equivalent expressions. When we solve 2,500 ÷ 300, we can think about using hundreds as a unit. Thus, when we use 25 ÷ 3 to solve 2,500 ÷ 300, we are indeed asking, "How many groups of 3 hundreds can we make with 25 hundreds?" Thus, the remainder must also be interpreted with the unit of the dividend and the divisor; that is, there is 1 hundred leftover. The remainder for 2500 ÷ 300 must be 100.

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	Unknown Product	Group Size Unknown ("How many in each group?" Division	Number of Groups Unknown ("How many groups?" Division)
	3 x 6 = ?	**3 x ? = 18 , and 18 ÷ 3 = ?**	**? x 6 = 18 , and 18 ÷ 6 = ?**
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example*. You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example*. You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example*. You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays Area	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example*. You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example*. You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example*. You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example*. A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example*. A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example*. A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	a x b = ?	a x ? = p , and p ÷ a = ?	? x b = p , and p ÷ b = ?

ESSENTIAL QUESTIONS

- How can we find evidence to support our conclusions?
- What happens in division when there are zeroes in both the divisor and the dividend?
- How are remainders and divisors related?
- What is the meaning of a remainder in a division problem?

MATERIALS

- "What is 2,500 ÷ 300?" recording sheet

GROUPING

Partner or Individual Task

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TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part 1
Students explore why dividing by zero is undefined.

Task Directions
Start this task with a whole group discussion regarding division and zero. Remind students about the relationship between multiplication and division and the product when one of the factors is zero. Then pose the following problem.

What happens when you divide by zero? Use
multiplication to justify your answer.
Were you surprised by your findings? Why or why not?

Regardless what approach the students elect to take with this task, when justifying using multiplication, they should notice that something strange happens.
For instance, if they choose to divide using a dividend of 12, they may discover something similar to the following:

$12 \div 12 = 1$	$12 = 12 \times 1$
$12 \div 6 = 2$	$12 = 6 \times 2$
$12 \div 4 = 3$	$12 = 4 \times 3$
$12 \div 3 = 4$	$12 = 3 \times 4$
$12 \div 2 = 6$	$12 = 2 \times 6$
$12 \div 1 = 12$	$12 = 1 \times 12$
$12 \div 0 = ?$	$12 = 0 \times ?$

If students choose to use a fact family they will have similar results.

If	$2 \times 4 = 8$,	then	$8 \div 4 = 2$
If	$4 \times 2 = 8$,	then	$8 \div 2 = 4$

Following the same pattern:

If	$0 \times 8 = 0$,	then	$0 \div 8 = 0$
If	$8 \times 0 = 0$,	but	$0 \div 0 \neq 8$

After students have had time to explore division with zero and share their findings explain that because any number multiplied by zero is zero, the last situation in both examples is impossible.
Therefore, division by zero is not possible and we call it "undefined".
Some students may have noticed that occasionally when using a computer or calculator, they are given an error message. Frequently that is caused by situations such as dividing by zero. Now that they understand why this may happen, they may enjoy playing with a computer or calculator to verify this message.
History also has interesting situations that have occurred due to division by zero. The USS Yorktown had a divide by zero error on September 21, 1997. This caused the ship's propulsion system to fail.

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Part II

Students determine whether a child's work is mathematically sound and give evidence for their conclusions.

Task Directions

Students will follow the directions below from the "What is 2,500 ÷ 300?" recording sheet.

Steven says the answer to 2500 ÷ 300 is 8, with a remainder of 1. He said, "My reason is because you can just cross out two 0s in both numbers to make it 25 ÷

3. The answer to 25 ÷ 3 is 8, with a remainder of 1." Is he correct? Why or why not?

FORMATIVE ASSESSMENT QUESTIONS

- What is the value of the one left over? How do you know?
- What is the number expression you are solving?
- Is it helpful to cancel out zeroes if you have them in both the dividend and divisor? Why or why not?
- What effect does a set of zeroes in the divisor and dividend have on the quotient? On the remainder?

DIFFERENTIATION

Extension

- Using a problem such as 208 divided by 30, have students explain and give evidence for ignoring the zeroes or using them as a shortcut to solving this division problem. Require an explanation that uses multiple representations to explain their conclusions.

Intervention

- Have students to use smaller numbers 50 divided by 10, have student to model or illustrate the problem and explain their thought process in solving the problem.

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Name_____Date

What is 2,500 ÷ 300?

Steven says the answer to 2500 ÷ 300 is 8, with a remainder of 1. He said, “My reason is because you can just cross out two 0s in both numbers to make it 25 ÷ 3. The answer to 25 ÷ 3 is 8, with a remainder of 1.” Is he correct? Why or why not?

Unit 1 Culminating Tasks

PERFORMANCE TASK: It's in the Numbers!

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STANDARDS FOR MATHEMATICAL CONTENT

MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whol e-number answers using the four operations, including problems in which remainders must be interpreted. 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
MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
MCC4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.

STANDARDS FOR MATHEMATICAL PRACTICE:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Background Knowledge

Students should have a thorough knowledge by this time of how to compare and order whole numbers. Students must be able to articulate how they know the sizes of digits in a given number and how to equate any number with its word form and/or expanded form. Students should know how to round to the nearest whole, ten, hundred, and thousand

ESSENTIAL QUESTIONS

- What kinds of things are large numbers used to measure?
- How can we tell which number among many large numbers is the largest or smallest
- How do people use data to make decisions in their lives?
- How does numerical data inform us when choosing a place to live?

MATERIALS

- "It's in the Numbers! Directions" Student Sheet
- "It's in the Numbers! Data Collection" Recording Sheet
- "It's in the Numbers! Questions" Recording Sheet

- Research materials
- Computers with Internet access
- Notebook paper

GROUPING

Individual Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this culminating task, students will collect data related to U.S. regional demographics, including population, precipitation, and area and use these data to draw conclusions about why people might choose to live there.

Comments

This task is intended to serve as a summative assessment. A sample rubric has been provided to support the use of this task as a culminating performance assessment. Students should be given a copy of the rubric as part of the teacher introduction to the assessment so they are aware of the rigor and quality of work that is expected. This task is appropriate to use in a variety of ways, including:

- Peer Review
- Display for parent night
- Portfolio

Task Directions

Students will follow the directions below from the "It's in the Numbers!" Recording Sheet.

Your job is to work on a committee to compare life in different regions of the United States. People will use your information when deciding in which part of the country they want to live.

FORMATIVE ASSESSMENT QUESTIONS

- What is the best way to organize your research?
- When comparing numbers how can you check to be sure that the comparisons are correct?
- What strategy for rounding works best for you? Can you demonstrate and explain it to me or another classmate?
- Explain how you know the value of multi-digit number.
- What do the numbers in your chart tell you about a particular region?

DIFFERENTIATION

Extension

- Activities such as these lend themselves to extended exploration of analyzing data using whole to compare further U.S. demographics and/or countries all over the world. An additional website is offered for the purpose of extending student understanding: http://money.cnn.com/magazines/moneymag/bplive/2007/

Intervention

- Help students organize the task and break it into smaller steps.
- Limit the number of student choices in terms of states or research resources to help them use their time wisely.
- Limit the number of regions (not less than three) so students will be able to round and compare sufficient data while avoiding getting bogged down in the research process.

Name_____Date _____

It's in the Numbers!

Directions

Your job is to work on a committee to compare life in different regions of the United States. People will use your information when deciding in which part of the country they want to live.

Step 1:

- Choose one state from each of the seven geographic regions of the country. Examples of possible states in each region are listed. Use the resources provided to decide which state you will research.
- The geographic regions are:

- New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island
- Mid-Atlantic: Delaware, Maryland, New Jersey, New York, Pennsylvania
- Southeast: Florida, Georgia, North Carolina, South Carolina, Alabama
- Midwest: Illinois, Iowa, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
- Rocky Mountain: Colorado, Idaho, Montana, Nevada, Utah, Wyoming
- Southwest: Arizona, California, New Mexico, Texas
- Northwest: Alaska, Oregon, Washington

Step 2:

- Using appropriate resources, record the information required to complete your data chart.
- Resources such as the Internet, Atlases, Almanacs, and Encyclopedias provide excellent current data.
- Suggested websites for Internet research include:

- http://www.census.gov/schools/facts/
- http://www.ers.usda.gov/statefacts/
- http://www.statemaster.com/index.php
- http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/nrmlprcp.html
- http://www.allcountries.org/uscensus/411_normal_monthly_and_annual_precipitation_selected.html

Step 3:

- Answer the questions provided using the data charts on your own notebook paper. Explain your answers thoroughly using complete sentences and correct math vocabulary.

Region	State	Population	Population	Precipitation	Precipitation	Size	Size
			rounded to nearest _____	in inches	in inches rounded to nearest whole number	in square miles	rounded to nearest square mile
New England							
Mid-Atlantic							
Southeast							
Midwest							
Rocky Mountain							
Southwest							
Northwest							

Name _____ Date _____

It's in the Numbers!

Questions

1. If someone wanted to live in a region with a large population, which region would you recommend to them and why?

2. If someone wanted to live in a region that didn't rain much, which region would you recommend to them and why?

3. If someone wanted to live in a region that had lots of space in which to move around without a lot of people, which region would you recommend to them and why?

4. Which two regions seem most like each other? How do you know?

5. Write all of the exact data (not rounded data) for one state in expanded form and word form.

6. In which region would you prefer to live? Explain why

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4th Grade Math Unit 1 Performance Assessment RUBRIC

Standard ↓	Exceeding	Meeting	Not Yet Meeting
MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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	Student explanation gives thorough description of numbers involved, the relative size of those numbers in relation to other, and how the number might impact a person's decision to live in that region.	Student explanation in regards to precipitation demonstrates an understanding of the relative size of various numbers.	Student response shows an inability to accurately equate standard form with either word name or expanded form or both.
MCC4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	Student response shows all correct word and/or expanded form for whole numbers	Student responses have minor errors in word and/or expanded form for whole numbers.	Student response has errors in word and/or expanded form for whole numbers.
MCC4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.	A student response shows all numbers are rounded to the nearest whole number correctly.	Student responses have minor errors in rounding whole numbers.	Student response has errors in whole number rounding and expands forms.

Performance Task: School Newspaper

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
MCC4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MCC4.OA.3 Solve multistep word problems posed with whole numbers and having whole- number answers using the four operations, including problems in which remainders must be interpreted. 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.
MCC4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
MCC4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
MCC4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

STANDARDS FOR MATHEMATICAL PRACTICE:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

ESSENTIAL QUESTIONS

- How do multiplication, division, and estimation help us solve real world problems?
- How can we organize our work when solving a multi-step word problem?
- How can a remainder affect the answer in a division problem?

MATERIALS

"School Newspaper" recording sheet

GROUPING

Partner or Individual Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comments

Multiplication, division, and rounding are essential elements of this task. You may wish to use the actual number of students within your school to make this task more meaningful for your class. Also, you may need to adjust the other numbers within the task to ensure the essential elements of the task are addressed.

While this task is intended to serve as a summative assessment, it also may be used for teaching and learning. It is important that all elements of the task be addressed throughout the learning process so that students understand what is expected of them. This task is appropriate to use in a variety of ways, including:

- Peer Review
- Display
- Portfolio

Task Directions

Students will follow the directions below from the "School Newspaper" recording sheet.

- Your class has agreed to publish a 26 page school-wide newspaper for each of the 1,740 students. Both sides of the paper will be printed to help save money. A package of 50 sheets of special newsprint paper costs $1.00.
- Find the cost of publishing the newspaper if you can make the copies at school for no additional cost other than purchasing the paper. Explain how you know.
- The students in your class do not have the money to pay for this much paper and your teacher does not have it in her budget. To solve this problem, it was agreed to ask local businesses to purchase advertisements to place in the newspaper. The prices that your class decided to charge are:
    - Full-page $50
    - Half-page $25
    - Fourth-page $15
- What is the fewest number of advertisement pages that you will need in order to pay for the paper and not make more than $15 over your expenses? How do you know?
- What is the largest number of pages that you will need to pay for the paper without going more than $15 over what you need to spend? Explain your thinking.
- Show a combination of all three sizes that would pay for the paper without using more pages than the largest number of pages needed to pay for the paper.

FORMATIVE ASSESSMENT QUESTIONS

- Can you describe your strategy for solving this problem?
- Explain how you know your answer is correct
- Is there any mental math you are using? Explain.
- How are you organizing the information in the problem to help you solve it?

DIFFERENTIATION

Extension

- How many extra copies of the newspaper could you make using the paper that you purchased? How do you know?
- If the school decided to charge $20 for the use of the copy machine, how would this change your answers?
- Instead of selling advertisements, your class decided to sell the newspapers to students. If they will be sold at a cost of $0.25, you are not sure that every student will buy one. Even though you are printing enough newspapers for every student, will you make enough money to cover the cost of the paper if only 500 students

purchase one? Explain your thinking.

- If each of the teachers in your school also wanted a copy of the newspaper, show how that would change your results.
- What would you need to charge for the advertisements if you wanted them to use no more than 2 pages? Tell why.
- If the school will not allow you to use the copy machine and you have to use a local printer, how would this affect the costs?

Intervention

- Have students work in small groups or with a partner.
- Adjust the number of copies needed for the newspapers.

Name_____Date _____

School Newspaper

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- Find the cost of publishing the newspaper if you can make the copies at school for no additional cost other than purchasing the paper. Explain how you know.

- The students in your class do not have the money to pay for this much paper and your teacher does not have it in her budget. To solve this problem, it was agreed to ask local businesses to purchase advertisements to place in the newspaper. The prices that your class decided to charge are:

    - Full-page $50
    - Half-page $25
    - Fourth-page $15

- What is the fewest number of advertisement pages that you will need in order to pay for the paper and not make more than $15 over your expenses? (You may use a fraction of a page for advertising.) How do you know?

- What is the largest number of pages that you will need to pay for the paper without going more than $15 over what you need to spend? (You may use a fraction of a page for advertising.) Explain your thinking.

- Show a combination of all three sizes that would pay for the paper without using more pages than the largest number of pages needed to pay for the paper.