Theme: **Suggested Days of Instruction: 45 days**

Ohio Learning Standards

OPERATIONS AND ALGEBRAIC THINKING (OA)

Use the four operations with whole numbers to solve problems.

1. Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 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.
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.
3. Solve multi-step 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 estimations strategies including rounding.*

Gain familiarity with factors and multiples.

4. Find all factor pairs for a whole number in the range 1-1 00. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.

NUMBERS AND OPERATIONS IN BASE TEN (NBT)

Generalize place value understanding for multi-digit whole numbers.

3. Use place value understanding to round multi-digit whole numbers to any place.

Use place value understanding and properties of operations to perform multi-digit arithmetic.

4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.*
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.*
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.

MEASUREMENT AND DATA (MD)

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

2. Use the four operations to solve word problems involving distances, intervals of time, liquid, volumes, masses of objects, and money, including problems involving simple fractions or decimals, and in terms of a smaller unit. Represent measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Commentary

Operations and Algebraic Thinking

Fourth graders have worked with equal group and array/area problem situations or multiplication and division in Grade 3. Multiplication and division comparison situations are introduced in Grade 4. Students continue to work with one- and two-step problems that use all four operations, including problems in which remainders must be interpreted in terms of the questions being asked in the problem.

Students extend their understanding of multiplication and division to thinking about these operations in terms of composing and decomposing numbers into factors. For example, 12 can be decomposed into factors of 1, 2, 3, 4, 6, and 12 by knowing the multiplication facts that results in a product of 12. Making arrays will help students to build understanding of factors, reinforcing fluency with basic facts and extending to factor pairs beyond the basic facts. This Standard extends this understanding through recognizing prime numbers (number with exactly two factors) and composite numbers (number with more than two factors).

Number and Operations in Based Ten

Fourth grade extend their understanding of place value to 1,000,000. They develop an understanding of the relationship among places in a number, and they use that understanding to read and write numbers from 1 to 1,000,000. Writing numbers in expanded notation reinforces the relationship among places as well as how to decompose a number in various ways. Students compare numbers by focusing on the value of a digit in a given place. They extend earlier work with rounding numbers to rounding numbers to any given place and using rounding to estimate in real-life situations.

Students apply the understanding of operations they have built in previous grades, place value understanding, and properties of addition and multiplication to add and subtract multi-digit numbers, multiply a one-digit number by a number up to four digits, as well as multiplying a two-digit number by a two-digit number. They apply and extend the strategies they have been using to develop fluent (accurate and efficient) procedures.

Measurement and Data

Fourth graders will focus their learning on understanding the relationship between units within one system of measurement. Emphasis will be place on solving word problems involving distances, intervals of time, Liquid volumes, masses of objects, money, and area and perimeter.

Instructional Resources
Text: Math Expressions Common Core Assessment Guide

Unit 3: Division with Whole Numbers (Sections: 3.1-3.11)
- Dividing Whole Numbers
- Division Issues and Word Problems

Unit 4: Equations and Word Problems (Sections 4.1-4.12)
- Reasoning and Solving Problems
- Comparisons Word Problems
- Problems with More Than One Step
- Analyzing Patterns

Source: Math Expressions: Common Core Assessment Guide

Differentiated Instruction Activities
Pages: 239, 247, 255, 261, 273, 282, 287, 301, 311, 319, 329, 335, 343, 349,
357, 363, 369, 379, 387, 393, 399, 405, 411, 421, 427, 435, 441, 449 and 457

Think Central Resources: www.thinkcentral.com
Below Level-Soar to Success, On Level-Mega Math, Challenge-Destination Math

Materials:

Unit 3

activity cards, counter, math journals, secret code cards, centimeter grid paper, index cards, base ten blocks, play money, number cubes, game cards

Unit 4

Activity cards, counters, index cards, number cubes, math journals, connecting cubes, centimeter grid paper, colored pencils, scissors, game cards, straightedge, two colored counters

Assessments

Unit 3: Quick Quiz 1 and 2 Unit 3 Assessment Form A and Unit 3 Assessment Form B
Unit 4: Quick Quiz 1, 2, 3, and 4; Unit 4 Assessment Form A and Unit 4 Assessment Form B

Adding Students Misconnections and Common Errors

4.OA.1

Students may struggle with applying their knowledge of multiplication and division facts to multiplicative situations since all of their previous experience was with equal groups and array models. They need many experiences connecting facts to the language of multiplicative comparisons. Using concrete models will support students in making this connection.

4.OA.2

Students may confuse additive and multiplicative situations. They need ta variety of problems to model and discuss. Identifying what they know from the information in the problem and focusing on the question will help them to make sense of the problem. They should also consistently ask themselves I f their answer make sense.

4.OA.3

Student who struggle in determining what operation to use to solve a problem need additional experience understanding the operations in a variety of situations. They should have explicit practice with various problem solving strategies including:

- Restating the problem in their own words.
- Identifying given, needed and wanted information
- Making a model or a drawing a picture.
- Making a list
- Acting it out
- Finding a pattern.
- Writing an equation.

Addressing Student Misconceptions and Common Errors Cont.

- Revisiting the question and asking themselves if the solution makes sense.

Students who do not have conceptual understanding or have focused work on division procedures tend to write answers to problems using the "r" notation. For example, 16 students are going canoeing. If each canoe holds 3 canoes, how many canoes will they need? The answer is 5 r 1 makes no sense in this situation. Students need to focus on the question and reasonableness of solutions using strategies including models, pictures, and acting it out.

4.OA 4

Students often confuse the terms *factor* and *multiple*. Emphasizing the term factor as one of the number multiplied to get a product throughout all of the work with multiplication, and expecting students to use the term, should help avoid confusion. Telling students they multiply to get a *multiple* or defining *multiples* of a number as products of the number is also helpful. The more experience students have with these terms, the more accurate they will become when using them.

When listing multiples of a number, students may forget to include the number itself. Reminding students that multiples are the products of a number leads to a discussion of why a number is a factor and a multiple of itself, which is a result of the identity element of multiplication (a X 1 = a).

Students may become confused about whether 1 is a prime or composite number, when actually it is neither prime nor composite because it has only one factor, itself. Developing precise definitions should help to eliminate this misconception.

4.NBT.3

Rounding to a place within a number can be difficult for students. For example, rounding 1,266 to the nearest ten means that students must recognize that it falls between 1,260 and 1,270. Understanding place value and thinking flexibility about the meaning of places in a number along with practices will help students to be successful rounding to any place. It is important that students make generalizations and use steps that make sense to them. Giving students meaningless rules about rounding up or rounding down often causes much confusion.

4.NBT.4

Students who struggle with the algorithm need more experience with concrete materials (place value charts, bundling and unbundling

Addressing Student Misconceptions and Common Errors Cont.

Straws into tens and hundreds). sure to scaffold examples so that students are comfortable with place value to hundreds or including one regrouping and two regroupings, and can explain their work before they work with four- and five-digit numbers or multiple addends.

Watch for students who subtract the smaller digit from the larger digit regardless of their position in the problem. These students need additional work with concrete models and decomposing tens or hundreds. Make connections between the work with models and the written equations explicit.

4.NBT.5

Students may ignore place value when multiplying multi-digit numbers, as shown in the following explain. Use concrete materials to review place value understanding (multiplying by a multiple of ten will give a product that is expressed as tens; 6 X 70 = 6 X 7 tends – 42 tens = 420). At this time the use of partial products and the distributive property will help to reinforce each part of a multiplication equation.

50	46	46	33
X46	X 32	X 32	X 52
300	12	1212	156
200	8		
500	18		
	12		
	50		

Extending simple area models to area models for multi-digit multiplication examples will also reinforce the role of partial products.

4.NBT. 6

Watch for students who get the place value of digits confused when dividing. Use the relationship between multiplication and division and students' previous experiences with estimation to help students realize the place value of the quotient.

Addressing Student Misconceptions and Common Errors Cont.

Consistently model questions such as the following to help students hone in on the quotient.

Example:

Martin has 183 Hot Wheels cars in his collection. He has boxes that each hold 8 Hot Wheels cars. How many boxes will be need to store the cars?

- Can he fill 10 boxes? Yes. How many cars will 10 boxes hold? 80 cars
- Can he fill 20 boxes? Yes. How many cars will 20 boxes hold? 160 cars
- Can he fill 30 boxes? No. How many cars will 30 boxes hold? 240 cars
- So if 20 boxes will hold 160 cars, how many cars still need to be put in a box? 23 cars
- How many boxes will hold 23 cars? 2 boxes
- So how many boxes will be full? 20 + 2 = 22 boxes
- Are there any cars that are not in a box? 1 car
- If he wants to put all of the cars in a box, how many boxes will he need? 23 boxes

Use partial quotients to allow students to chunk the numbers into smaller pieces, make the problem more manageable, and avoid mistakes when there is a zero in the quotient.

Give students opportunities to find and use compatible numbers in determining the quotient.

Example:

For example 263÷4

Think 240÷4 first because 4 and 24 are compatible numbers.

4. MD. 2

Some students may have difficulty converting a word problem into the necessary mathematical form needed to solve the problem. To address this, teachers need to provide multiple experiences with measurement problems on an ongoing basis.

Source: The Common Core Mathematics Companion: The Standards Decoded (What They Say, What They Mean, How to Teach Them)
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