Unit Map 2012-2013

Monroe #2 - Orleans BOCES (Regional Collaboration)

Collaboration / Math 5* / Grade 5 (Math Regional Curriculum)

Wednesday, October 31, 2012, 10:56AM

Standard/Module: Proficiency in Base 10 5.NBT.2 (Week 1, 12 Weeks)

Stage 1: Desired Results

Standards Focus

- Major (70%) Connects to 5.NBT.1, 5.NBT.3, and 5.NBT.4

5th Grade Map.pdf

Standards

NYS: CCLS:Mathematics, NYS: 5th Grade , Number & Operations in Base Ten

5.NBT Understand the place value system.

- 2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Enduring Understandings

1. Relationships can be described and generalizations made for mathematical situations that have numbers or objects that repeat in predictable ways.
2. Numbers can be used for different purposes, and numbers can be classified and represented in different ways
3. Some relationships, mathematical expressions and equations can be used to describe how members of one set are related to members of a second set
4. Understand that the product of a decimal and 10, 100, or 1000 is the value of the decimal with the decimal point moved 1, 2, and 3 places to the right respectively.
5. Place-value patterns can be used to mentally divide decimals by 10, 100, or 1000.

Essential Questions

1. When in everyday life do you use decimals?
2. What is the rule for multiplying decimals by 10^1, 10^2, 10^3?
3. What patterns do you see?
4. What are the standard procedures for estimating and finding products involving decimals?
5. What are the standard procedures for estimating and finding quotients involving decimals?

Critical Content

Place Value

-base 10

-exponents

-decimals

-whole numbers

-multiply/divide

Skills	Vocabulary
1. Students will mentally compute products of whole numbers using place-value patterns and the properties of multiplication. 2. Students will understand that patterns can be used when mentally multiplying decimals by multiples of 10, 100, or 1000. 3. Students mentally multiply decimals by 10, 100, and 1000. 4. Students find the value of 10, 100, and 1000 coins worth different values. 5. Students will understand that the product of a decimal and 10, 100, or 1000 is the value of the decimal with the decimal point moved 1, 2, or 3 places to the right respectively. 6. Students will understand that patterns exist when dividing a decimal by 10, 100, or 1000.	Tier 2- generalization, pattern, relationships, Tier 3- Factors, products, multiple, exponents, place value, decimals, quotient, divisor, dividend, exponential notation, exponent, base, standard form, expanded form, squared, cubed, power

Stage 2: Assessment Evidence

Assessments

Explain the place valeu
Formative: Test: Written

Students should be able to use place value and mathematical reasoning to **explain why** the following multiplication and division problem by powers of 10 make sense:

$523 \times 10^3 = 523{,}000$ --> The place value of 523 is increased by 3 places.

5.223×10^2 522.3 --> The place value of 5.223 is increased by 2 places.

$52.3 \div 10^1$ 5.23 --> The place value of 52.3 is decreased by one place.

Stage 3: Learning Plan

Learning Activities	Resources

This standard includes multiplying by multiples of 10 and powers of 10, including 102 which is 10 x 10=100, and 103 which is 10 x 10 x 10=1,000. Students should have experiences working with connecting the pattern of the number of zeros in the product when you multiply by powers of 10. **Example:** $2.5 \times 10^3 = 2.5 \times (10 \times 10 \times 10) = 2.5 \times 1{,}000 = 2{,}500$ Students should reason that the exponent above the 10 indicates how many places the decimal point is moving (not just that the decimal point is moving but that you are multiplying or making the number 10 times greater three times) when you multiply by a power of 10. Since we are multiplying by a power of 10 the decimal point moves to the right. $350 \div 10^3 = 350 \div 1{,}000 = 0.350 = 0.35$ $350 \div 10 = 35$, $35 \div 10 = 3.5$ $3.5 \div 10 =.0.35$, or $350 \times 1/10$, $35 \times 1/10$, $3.5 \times 1/10$ This will relate well to subsequent work with operating with fractions. This example shows that when we divide by powers of 10, the exponent above the 10 indicates how many places the decimal point is moving (how many times we are dividing by 10 , the number becomes ten times smaller). Since we are dividing by powers of 10, the decimal point moves to the left. **Students need to be provided with many opportunities to explore this concept and come to this understanding; this should not just be taught procedurally.**	www.illustrativemathematics.org www.illuminations.nctm.org

<u>Students might write:</u> $36 \times 10 = 36 \times 10^1 = 360$ $36 \times 10 \times 10 = 36 \times 10^2 = 3600$ $36 \times 10 \times 10 \times 10 = 36 \times 10^3 = 36{,}000$ $36 \times 10 \times 10 \times 10 \times 10 = 36 \times 10^4 = 360{,}000$ **Students might think and/or say:** **I noticed that every time, I multiplied by 10 I added a zero to the end of the number. That makes sense because each digit's value became 10 times larger. To make a digit 10 times larger, I have to move it one place value to the left.* **When I multiplied 36 by 10, the 30 became 300. The 6 became 60 or the 36 became 360. So I had to add a zero at the end to have the 3 represent 3 one-hundreds (instead of 3 tens) and the 6 represents 6 tens (instead of 6 ones).* Students should be able to use the same type of reasoning as above to **explain why** the following multiplication and division problem by powers of 10 make sense.	

$523 \times 10^3 = 523{,}000$ -->The place value of 523 is increased by 3 places. 5.223×10^2 522.3 -->The place value of 5.223 is increased by 2 places. $52.3 \div 10^1$ 5.23 -->The place value of 52.3 is decreased by one place.	

Differentiation Opportunities

A common misconception that students have when trying to extend their understanding of whole number place value to decimal place value is that as you move to the left of the decimal point, the number increases in value. Reinforcing the **concept of powers of ten** is essential for addressing this issue.

A second misconception that is directly related to comparing whole numbers is the idea that the longer the number the greater the number. With whole numbers, a 5-digit number is always greater that a 1-, 2-, 3-, or 4-digit number. However, with decimals a number with one decimal place may be greater than a number with two or three decimal places. For example, 0.5 is greater than 0.12, 0.009 or 0.499. One method for comparing decimals it to make all numbers have the same number of digits to the right of the decimal point by adding zeros to the number, such as 0.500, 0.120, 0.009 and 0.499. A second method is to use a place-value chart to place the numerals for comparison.

<< Previous Year

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