

Grade 5 Math Unit 4 - Numbers and Operations in Base Ten

UNIT OVERVIEW

Grade 5 instruction time centers around 3 Critical Areas of Focus. This unit is connected to **Focus Area #2**, Extending division to 2-digit divisors, integrating decimal fractions into the place value system and **developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations**.

(See Connections for explanation)

This unit address the following clusters:

- Understand the place value system
- Perform operations with multi-digit whole numbers and with decimals to hundredths

STANDARDS

CC_Core Core State Standards - Mathematics (2010) - Grade 5

Domain 5.NBT Number and Operations in Base Ten

Cluster Statement: *Understand the place value system.*

Standard 5.NBT.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.

Standard 5.NBT.4 Use place value understanding to round decimals to any place.

Cluster Statement: *Perform operations with multi-digit whole numbers and with decimals to hundredths.*

Standard 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.

Standard 5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.

Standard 5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Content Elaborations

5.NBT.2,
5-6

Students continue their work on 5.NBT.2, 5.NBT.5, 5.NBT.6.

This standard refers to rounding. Students should go beyond simply applying an algorithm or procedure for rounding. The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when they round. Students should have numerous experiences using a number line to support their work with rounding. When rounding a decimal to a given place, students may identify the two possible answers, and use their understanding of place value to compare the given number to the possible answers.

5.NBT.4

Example: Round 14.235 to the nearest tenth.

Students recognize that the possible answer must be in the tenths thus, it is either 14.2 or 14.3. They can identify that 14.235 is closer to 14.2 (14.20) than to 14.3 (14.30)

Students should use benchmark numbers to support this work. Benchmarks are convenient numbers for comparing and round numbers. 0., 0.5, 1, 1.5 are examples of benchmark numbers.

MP.2, MP.6, MP.7 should be emphasized.

This standard builds on work from fourth grade where students are introduced to decimals and compare them. In fifth grade, students begin adding, subtracting, multiplying and dividing decimals. This work should focus on concrete models and pictorial representations, rather than relying solely on the algorithm. The use of symbol notations involves having students record the answers to computations ($2.25 \times 3 = 6.75$), but this work should not be done without models or pictures.

This standard includes students' reasoning and explanations of how they use models, pictures, and strategies. This standard requires students to extend the models and strategies they developed for whole numbers in grades 1-4 to decimal values. Before students are asked to give exact answers, they should estimate answers based on their understanding of operations and the value of the numbers.

5.NBT.7

Examples:

- $3.6 + 1.7$ A student might estimate the sum to be larger than 5 because 3.6 is more than $3 \frac{1}{2}$ and 1.7 is more than $\frac{1}{2}$.
- $5.4 - 0.8$ A student might estimate the answer to be a little more than 4.4 because a number less than 1 is being subtracted.
- 6×2.4 A student might estimate an answer between 12 and 18 since 6×2 is 12 and 6×3 is 18. Another student might give an estimate of a little less than 15 because s/he figures the answer to be very close, but smaller than $6 \times 2 \frac{1}{2}$ and then of $2 \frac{1}{2}$ groups of 6 as 12 (2 groups of 6) + 3 ($\frac{1}{2}$ of a group of 6)

MP.2, MP.3, MP.4, MP.5, MP.7 should be emphasized.

UNIT VOCABULARY

Commutative Property of Addition
Associative Property of Addition

Identity Property of Addition
inverse operations

Associative Property of Multiplication
Commutative Property of Multiplication
Identity Property of Multiplication

BIG IDEAS

ENDURING UNDERSTANDINGS

ESSENTIALS QUESTIONS

Choose a few questions based on the needs of your students

- Addition and subtraction with decimals are based on the fundamental concept of adding and subtracting the numbers in like position values---a simple extension from whole numbers.

- Students will understand that the placement of the decimal is determined by multiplying or dividing a number by 10 or a multiple of 10.

- Students will understand that rules for multiplication and division of whole numbers also apply to decimals.

- How can I use place value and properties to add and subtract decimals?
- How is multiplying and dividing decimals similar to multiplying and dividing whole numbers?

CONNECTIONS

In **Critical Focus Area #2**, students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number) to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

This unit is connected to:

4.NBT.5-6 and 4.NF.7

MP.1 Make sense of problems and persevere in solving them

MP.2 Reason abstractly and quantitatively

MP.3 Construct viable arguments and critique the reasoning of others

MP.4 Model with mathematics

MP.5 Use appropriate tools strategically

MP.6 Attend to precision

MP.7 Look for and make use of structure (Deductive reasoning)

MP.8 Look for and express regularity in repeated reasoning (Inductive Reasoning)

Understand the place value system

CONTENT		SKILLS
5.NBT.4	Use place value understanding to round decimals to any place	Use place value understanding to round decimals to any place 1. Use a number line to support work with rounding 2. When rounding a decimal to a given place, identify and compare the two possible answers 3. Use benchmark numbers when comparing and rounding numbers. (e.g., 0, 0.5, 1, 1.5, etc.)

Perform operations with multi-digit whole numbers and with decimals to hundredths

CONTENT		SKILLS
5.NBT.7	Add and subtract decimals to the hundredths.	Add and subtract decimals to the hundredths. 1. Estimate answers to addition and subtraction of decimals based on understanding of operations and place value 2. Add and subtract decimals using base ten blocks or drawings. 3. Add and subtract decimals using a written method 4. Explain the reasoning used to add and subtract decimals.
5.NBT.7	Multiply and divide decimals to the hundredths.	Multiply and divide decimals to the hundredths. 1. Estimate answers to multiplication and division of decimals based on understanding of operations and place value 2. Multiply and divide decimals using base ten blocks 3. Multiply and divide decimals using area model 4. Multiply and divide decimals using a written method 5. Explain reasoning used to multiply and divide decimals.

UNIT RESOURCES

Common Core Model Curriculum

Hands on Standards - Number & Operations, Grade 3/4 lessons 1, 2, 9, 14, 22, 23

Manipulatives - Base Ten Blocks, Ten Frames

McGraw-Hill, **My Math** Chapters 5-6

Number Talks by Sherry Parrish

Georgia Math frameworks, Grade 5 Units 2-3

IXL - <http://www.ixl.com/math/standards/common-core/grade-5>

Math Playground/Common Core http://www.mathplayground.com/common_core_state_standards_for_mathematics_grade_5.html

Educational games connected to CCS

Base Block Decimals http://nlvm.usu.edu/en/nav/frames_asid_264_g_3_t_1.html?from=search.html?qt=decimal

United Streaming - Place Value