

**USOE 2007 Pre-Algebra Core Curriculum**

**Standard 1: Students will expand number sense to understand, perform operations, and solve problems with rational numbers**

1. **Compute** fluently with understanding and make reasonable estimates with rational numbers.
  - a. **Compute** fluently using all four operations with integers, and **explain** why the corresponding algorithms work.
  - b. **Compute** fluently using all four operations with rational numbers, including negative fractions and decimals, and **explain** why the corresponding algorithms work.
  - c. Check the reasonableness of results using estimation.
2. **Analyze** relationships among rational numbers, including negative rational numbers, and operations involving these numbers.
  - a. **Order** rational numbers in various forms, including scientific notation (positive and negative exponents), and **place numbers** on a number line.
  - b. **Predict** the effect of operation with fractions, decimals, percents, and integers as an increase or a decrease of the original value.
  - c. **Recognize and use** the identity property of addition and multiplication, the multiplicative property of zero, the commutative and associative properties of addition and multiplication, and the distributive property of multiplication over addition.
  - d. **Recognize and use** the inverse operations of adding and subtracting a fixed number, multiplying and dividing by a fixed number, and computing squares of whole numbers and taking square roots of perfect squares.
3. **Solve problems** involving rational numbers using addition, subtraction, multiplication, and division.
  - a. **Recognize** the absolute value of a rational number as its distance from zero.
  - b. **Simplify** numerical expressions, including those with whole number exponents and absolute values, using the order of operations.
  - c. **Solve problems** involving rational numbers, percents, and proportions.

**Common Core State Standards Grade 7**

**The Numbers System 7.NS: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**

1. **Apply and extend** previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
  - a. **Describe** situations in which opposite quantities combine to make 0.
  - b. **Understand**  $p+q$  as the number located a distance  $|q|$  from  $p$ , in the positive or negative direction depending on whether  $q$  is in the positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
  - c. **Understand** subtraction of rational numbers as adding the additive inverse,  $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply the principal in real-world contexts.
  - d. **Apply properties** of operations as strategies to add and subtract rational numbers.
2. **Apply and extend** previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
  - a. **Understand** that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as  $(-1)(-1) = 1$  and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
  - b. **Understand** that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If  $p$  and  $q$  are integers, then  $-(p/q) = (-p)/q = p/(-q)$ . Interpret quotients of rational numbers by describing real-world contexts.
  - c. **Apply** properties of operations as strategies to multiply and divide rational numbers.
  - d. **Convert** a rational number to a decimal using long division, know that the decimal form of a rational number terminates in 0s or eventually repeats.
3. **Solve real-world and mathematical problems** involving the four operations with rational numbers.